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Damming Science:
Problems of Scientific Research in Environmental Administration

by
Chad M Briggs

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PhD Thesis
Department of Political Science
Carleton University

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The undersigned hereby recommend to
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acceptance of the thesis,

Damming Science: Problems of Scientific Research in Environmental Administration

submitted by
Chad M. Briggs, B.A., M.A.

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Chair, Department of Political Science

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Abstract

Many analyses of environmental policy and administration have focussed upon the difficulties involved in employing scientific research, especially in the area of large development projects. Yet the literature to date has been largely disjointed, divided into questions of philosophy of science or the workings of public administration. This has meant that either definitions of science and rationality have been haphazard, or that close examination of administrative processes has been avoided. This research attempts to bring together various literatures related to the question of how science works in environmental policy, arguing that scientific research is often fundamentally inimical to common political processes present within public administration. A common assumption exists that political consensus can be formed solely by reference to objective facts, that political rationality can be brought under the control of science. Yet politics and science do not operate in the same fashion, and attempts to bring them together or force certainty upon political questions often result in the failure of scientific research.

This thesis first develops a working definition of science, and contrasts it with the various forms of rationality with which science has so often been confused. This examines past approaches to analyzing science and politics, showing how a more centrist approach is preferable to the more common logical positivist or constructivist schools of thought. This theoretical section then proceeds to examine how the critical and conditional nature of knowledge, necessary for science and research, is lost within day-to-day operations of administrative agencies. The case studies in this research focus upon

dam construction and water resources management in three industrialized countries.

Using historical and comparative research, these cases illustrate how and why organizations use falsified or fraudulent research to support their goals, and why such an approach cannot alleviate political conflict. Rather than insisting that only one political solution exists, effective environmental management requires a process in which facts are considered conditional and outcomes can be evaluated differently by competing groups. Only by sustaining open forms of government can policy be properly legitimated and scientific research be maintained.

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Abbreviations

ALP	Animas-La Plata Project
BuRec	US Bureau of Reclamation
CAP	Central Arizona Project
CBA	Cost Benefit Analysis
DOI	US Department of Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJDF	EarthJustice Legal Defense Fund
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
FOIA	Freedom of Information Act
FSEIS	Final Supplement to the Environmental Impact Statement
IUCN	International Union for Conservation of Nature
M&I	Municipal and Industrial use of water
MTA	Hungarian Academy of Sciences (Magyar Tudomány Akadémia)
NEPA	National Environmental Policy Act
NFB	Norwegian Friends of the Earth (Naturvernforbund)
NVE	Norwegian Water Resources and Energy Administration (Norges vassdrags- og energidirektorat)
OMB	US Office of Management and Budget

TA	Technology Assessment
USGS	US Geologic Survey
USFWS	US Fish and Wildlife Service
WCIP	World Council of Indigenous Peoples

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Introduction

Science, Environmental Policy and Administration

Reality is merely an illusion, albeit a very persistent one.

-Albert Einstein

Environmental politics have always been inseparably fused with concepts of science. Dealing with claims and counter claims regarding our actions and impacts upon the natural world, the choices made in environmental policy rely heavily upon notions of science and scientific knowledge. At the same time, critics implicate science for the very same damage it purportedly solves. The precise role of science in environmental policy is a multifaceted, complex relationship. Between the general accounts of science as a global panacea, and descriptions of how science is responsible for those very problems, exists a nuanced yet important set of questions regarding epistemology and control of information.

With most of the public still trusting science and scientists more than politicians, those in politics find it useful to bolster their claims by appealing to scientific evidence. Claiming that such evidence makes their claims more objective and free from ideological bias, the general term 'science' becomes a catch-phrase for a supposed neutral field within politics, an area within which debates may become non-political. The concept of an objective and external reality, against which alternative interpretations and ideological bias are not determinable, means that an area 'beyond' politics is either attainable or

approachable. To claim that a position is 'scientifically justified' is akin to claiming that further debate on the subject is futile. This has changed notions of rationality, and the concepts of science and rationality are used interchangeably. One cannot, it is argued, be rational without being scientific.

Yet rationality is hardly a new concept, and the development of science has perhaps clouded its discussion (at least in the English-language world). To be rational merely means having the ability to choose the optimal action from a range of possible alternatives, even if cognitive, physical, or time constraints limit this range of alternatives. The development of a scientific world-view changed this to the ideal that there could be only one form of rationality, that only one outcome was possible regardless of culture, perspective, or time. Such a view of a universal rationality driving politics, that beliefs could be justified in reference to a foundation of knowledge, are at least as old as Descartes' efforts to find a solid grounding for philosophy. Cartesian beliefs that ethics, morals or politics may be both justified and irrefutable have continued since the eighteenth century.

Rationality came to be identified with the path to public agreement. It followed that when there was apparently irresolvable disagreement, reason was obviously not part of the picture.(1)

These beliefs have persisted, and continue in calls that environmental policies be made more 'rational', 'scientific', or any host of other terms which imply that a solution can be

1. Roger Trigg. 1993. *Rationality and Science: can science explain everything?* New York: Blackwell Publisher, p. 3.

found in an extra-political manner. And when 'reason' and 'rationality' are used in the manner quoted above, they do imply a certain form of rationality.

Essentially, what such an argument relies upon is the notion that political and scientific rationalities are and can be the same, that one can bring politics under the control of science. Any other form of thought would thereafter be considered 'irrational', not worthy of consideration unless it could be justified through scientific rationality and knowledge. The hope has been that science, which has been so successful in uncovering the underlying order to the universe, could accomplish similar feats here on Earth. If nature and the environment can be tamed, then why not our own natures? If science can be a guide into the physical world, then it can be a useful (if not essential) guide to how we relate to that world and how we should govern our actions. And where the natural and social dimensions meet, as in environmental politics, this should be even more true.

That these assumptions are widely held does not make them unquestionable, and the purpose of this thesis is to address the three major questions such a view of science and politics raises. The first concern is whether or not science can provide the 'correct' or optimal policy choice. Is it possible to say that a given policy is 'scientifically justified'? A closely related concern, although still distinct, is to ask whether science is even appropriate to the questions asked. Can our political decisions be reduced to scientific questions, and can scientific rationality supplant politics? Finally, this thesis must address whether science can be employed effectively in an administrative atmosphere. That is, are scientific and political (specifically, administrative) rationalities compatible? When the state claims that it is basing its policies upon scientific evidence, is it even accurate to

accept such evidence as 'science', and how can one make this judgement? This third question is perhaps the most difficult of the three to answer, and it is the most overlooked in the relevant literature. This is also the most important question, both as to the answer and why so few raise this question.

I would argue that the short answer to all three of the above questions is either 'no' or 'not necessarily'. Science is generally not able to provide any clear indication of what is an 'optimal' policy choice, for political criteria are different from scientific ones, and the values concerned in the process are often at odds with one another. And if science cannot provide such clear direction absent political judgement, framing political issues in entirely scientific terms is also not appropriate. As Alvin Weinberg described in his conception of 'trans-science', there are many questions which one can ask in scientific or technical terms, yet cannot be answered in such fashion.⁽²⁾ Finally, administrative agencies cannot or often do not use nor conduct science in such a way that it can remain scientific. In practice, scientific research cannot easily survive within administration, and its existence is often highly detrimental to the goals and operation of administrative agencies. Science cannot act as an independent guide to political action, and politics cannot control science without risking loss of what it means to be 'scientific'. As a result, what often passes for science in administrative politics and policy is nothing of the sort. It is quite possible to fabricate evidence so that it appears scientific, while retaining none of its attributes as 'science.' At the same time, criticisms of science that characterize

2. Giandomenico Majone. 1989. *Evidence, Argument, & Persuasion in the Policy Process*. New Haven: Yale University Press, p. 3.

research as always politically motivated and non-objective are neither necessary nor useful. One must distinguish between when science is science, and when it is not.

The first two areas of concern have been addressed by other authors previously, and many of them will be cited throughout the research. In particular, critics of 'development' have long been concerned with the technocratic nature of development policies, and such writers have come from fields such as political science, geography, anthropology, sociology, philosophy and even within the natural sciences themselves. In many ways, this is a continuation of such concern. The material highlighted in the case study chapters focusses on dam construction, an area emblematic of development in all areas of the world. The works of Ferguson and Scott are particularly illustrative in terms of the technocratic discourse of development, at least in terms of how it is applied in non-industrialized countries.(3)

Within this relevant literature, however, two things have been missing. The first is a larger implication that the problems of technocratic administration are inherent in all government, and not simply those in so-called 'developing countries'. Secondly, public administration literature has largely been silent on the ability or inability of administration to handle scientific research. Although questions have been raised, these have usually been by those either outside of political science (such as Shrader-Frechette) or on a case-by-case basis. Taken together, these two missing areas of the literature necessitate posing the question above: can public administration adequately handle scientific research, and,

3. See James Ferguson. 1996. *The Anti-Politics Machine*. Minneapolis: University of Minnesota Press; James C. Scott. 1999. *Seeing Like a State*. New Haven: Yale University Press.

if not, what processes may account for its inability to do so?

Overview of the Text

I will develop these arguments more fully in the chapters that follow, but it is important to begin with these questions. This chapter starts by considering the question of whether science can act as a solid guide for policy decisions. This serves as a useful starting point for discussion, as it must address both the relevant literature in philosophy/sociology of science, and also the difficulties in studying the topic of science in policy, generally. This will make apparent the assumptions and background from which this research is operating, and serves as a critique of the instrumentalist/logical positivist school of thought in science studies. Yet this research also diverges from the dominant school of thought opposed to instrumentalism, generally known as constructivism. This disagreement necessitates the development of a definition of science which is somewhat at odds with the two most vocal sides of the science debates.

The second thesis question, whether science is applicable to political questions, will be considered in the second chapter, where a more detailed definition of science is laid out. Once one can better define what science is and how it is distinct from politics, it becomes easier to appraise the usefulness of combining scientific and political rationalities. This entails pointing out how scientific and political rationalities differ, and why they should not be considered the same. As will be elaborated upon in Chapter 2, science in the context of this thesis refers primarily to a type of methodology and inquiry, following certain flexible traditions, which have in common the regulative ideal of 'truth'

concerning certain questions. This may involve scientific research in the physical, natural or social sciences, as long as it uses empirical evidence and follows the dictum of not determining the conclusion ahead of time, thus ignoring all contrary evidence.

Development of this definition will lead into Chapter 3, which will examine the specific processes by which political administration misuses/abuses scientific research.

Although these first chapters will use examples to illustrate the points made, this may not be sufficient to fully elaborate upon the manner in which science is used or misappropriated in administration. In order to provide a more solid empirical basis for this research, the second half of this thesis will provide case studies from environmental policy, detailing how science has been used in different contexts and in different countries. The explanation of how science operates in administrative institutions is not meant to be purely theoretical. Such abstract explanations of the concepts involved are necessary, but without some grounding in the actual practice of policymaking environments, the utility of such studies is limited. The works setting out the general processes by which science is compromised in administration, such as Brunsson and March, are based upon empirical studies of organizations.

Even so, however, these studies of organizational behaviour do not indicate whether such political processes of false reasoning affect science in the same manner as other information. Moreover, the general nature of such explanations may be slightly deceiving; do the same processes exist in different political systems? The case studies in this research are therefore meant to illustrate the processes by which administrative politics nullify scientific inquiry, and how the instrumental vision of politics is harmed in

the process. By using historical examples (although they are still present-day issues in many ways), the case studies can also show how the strain on instrumental visions affects the larger political context.(4)

If science cannot be well handled in situations of administrative rule, it is worth asking under what conditions it may be achieved. Particularly as modern public administration cannot be dispensed with, nor should it be, the task of finding solutions to the problems of goal displacement, poor data management, scientific fraud and poor communication are more than academic.(5) Generally speaking, technocratic politics (often in the guise of science) are expressions of political power from certain groups. In order to ensure that policies are not legitimated under false pretenses, that the science is both genuine and not used to mask political values, no one agency should be allowed to control the administrative process. Competing, overlapping agencies with substantial public input must also be present. Although these factors may make the political process seem less 'efficient', as the case studies will show, competing, diverse interests may help to expose or prevent many instances of scientific fraud and mimicry.

The focus of this research will be upon water resource management, an area of environmental policy that has growing importance around the world, as well as having a long tradition of incorporating ideas of science-in-policy. One of the primary purposes of

4. For a discussion on the specific problems concerning case study research, see Robert K. Yin. 1981. "The Case Study Crisis: Some Answers." *Administrative Science Quarterly*. 26 (March), pp. 58-65; See also A. Lijphart. 1975. "The comparable cases strategy in comparative research." *Comparative Political Studies*. 8, pp. 158-177.

5. These processes are explained in some detail in Chapter 3.

focussing upon dams concerns their symbolic importance to the state. For thousands of years, dams have symbolized the power of the state, and in modern times they have reinforced notions of state sovereignty. Both a sovereign's power over nature and its power over its subjects/citizens have been exemplified by such projects. To oppose a dam, then, is to oppose the power of the state itself, and this is no simple task.(6) Dams and irrigation projects have historically been built in areas where the state wished to extend its power; this was as true in northern, industrialized countries as elsewhere. Indeed, the Lockean basis of modern sovereignty requires that the government intervene in areas where little infrastructure had existed before, even if no suitable justification can be found.(7) In many instances, dams provided just such grounds for action and development.

First, however, one must consider why the study of this topic must be approached carefully, and what other definitions already exist regarding the general term 'science'. Too many studies have proceeded upon the assumption that there is no need to define science, or that attempts to do so cannot be made outside of specific contexts. Yet in order to adequately assess whether science exists or has been affected in political environments, we must first understand why the topic is so difficult to study, and why many contemporary theories are inadequate to the task.

6. Edward Goldsmith and Nicholas Hildyard. 1984. "The Politics of Damming." *The Ecologist*. 14, 5-6, pp. 221-231.

7. See the argument made by Thom Kuehls. 1996. *Beyond Sovereign Territory*. Minneapolis: University of Minnesota Press.

Part One

Chapter One

The Problems of Studying Science in Policy

For men become civilized, not in proportion to their willingness to believe, but in proportion to their readiness to doubt.

-HL Mencken

Competing Definitions of Science

To make the claim that science and politics do not make a good match is not to say that science does not or cannot play a constructive role in environmental policy. Rather, this is said to point out that we have often misunderstood or misperceived science's place in the political process. The more frequently used definitions of science suffer from a general lack of clarity in use. In many respects, this lack of clarity is deliberate. The term science is alluded to in any number of different contexts and for different reasons, while the broadness of the term is useful in laying blanket claims of criticism or defence. Descriptions of how science plays a role in policy are often constructed in such a way as to give legitimacy to its place in that very policy, or to downplay its importance when it is not desired. As George Orwell wrote, ill-formed thoughts and arguments can lead to poor use of language and the inability to define terms. Once such practices have become common, the converse is also true. Generalizations of the term 'science' may lead back to ill-formed thoughts, for there exists no point of

reference in debates of the subject.(1) As Sonja Boehmer-Christiansen remarks,

Social scientists when studying the role of science tend to over-simplify. They rarely differentiate between the various sciences and usually exclude their own fields whenever the term 'science' is used. There seems to be no rational reason for doing so.(2)

'Science' is a term whose common use has become hopelessly muddled, and the usefulness of referring to an abstract concept diminishes the more as its meaning becomes nebulous.

Members of the public may be aware that science represents a method of inquiry, but only refer to science in general conversation as pertaining to specific professions of the hard sciences. This narrow focus on physics and chemistry does not fit well with the parallel use of the term to denote a form of world-view, or 'scientific rationality.' As well, the focus on facts over method implicit in many uses of the word does not fit with characterizations of science as responsible for decisions concerning the application of technology.(3) Does science refer to a single unitary method of explanation, a body of knowledge, a category of profession, or an aspect of politics? It may be all these things, if

1. George Orwell. 1968a. "Politics and the English Language", in : *The Collected Essays, Journalism and Letters of George Orwell (Vol IV)*. S. Orwell and Angus (eds.), London: Secker and Warburg, pp. 127-140.

2. Sonja Boehmer-Christian. 1992. "How much 'science' does environmental performance really need?" in : *Achieving Environmental Goals*. Lykke (ed.), London: Belhaven Press, p. 139.

3. George Orwell. 1968b. "What is Science?" in : *The Collected Essays, Journalism and Letters of George Orwell (Vol IV)*. S. Orwell and Angus (eds.), London: Secker and Warburg, pp. 10-13.

defined variously. The use of general terms such as 'science' and 'rationality' leave its study open to attack from critics, and makes many science-in-policy discussions appear black or white. These are not meant to be simple issues, and the actual processes of science as it is used in policy are quite difficult to discern.

However difficult these questions may be, it is nonetheless necessary to explain them more fully, and to inquire why the problem of science in environmental administration has remained a murky issue. One can begin where the issues of science and politics seem most perplexing, and this thesis began in just such a process within environmental politics. Because environmental issues deal so directly with the natural world, it has been commonplace to frame environmental issues in scientific terms, and to rely upon science for evidence and guidance. Yet the attitudes many have toward science are not consistent, and often are quite ambivalent. The original research focus concerned the reasons why science was used to differing extents in environmental policy. Why was science seemingly more acceptable in some countries than in others, and what factors contributed to such differences? This was to involve examination of social and cultural backgrounds to different countries by way of case studies, using discourse analysis to uncover the different ways in which science was made acceptable.(4)

I was originally puzzled by the 'science wars' which had emerged after Alan Sokal published his 1996 hoax article in *Social Text*. Sokal's article was meant as a parody of post-modern thinking regarding science, but was accepted for publication in a

4. See Maarten Hajer. 1995. *The Politics of Environmental Discourse*. Oxford: Clarendon Press.

peer-reviewed journal, ironically in the same issue which was meant to criticise Gross and Levitt's attack on post-modernism.(5) These arguments sparked an interest in what may have persuaded many academics to reject traditional scientific approaches. Was this part of a larger background of post-materialism in certain countries, perhaps affected by wealth and education policies?(6) And in the end, would such attitudes have implications for the formation and legitimation of environmental policies? I was already aware of problems of rationality in policymaking, and of problems concerning justification of theories in science, yet I had not been able to put the two ideas together. By keeping the issues separate, I naively assumed that if there were rationality problems in policy, the science itself was likely still sound. The problem, I argued, was in importing pseudo-scientific methodologies to policymaking in attempts to make the policy *appear* more scientific.(7)

The initial approach to this current research was overly broad, for far too many variables could account for how well society receives science. Ultimately, however, these questions centred on the issue of how and why science was considered a legitimating

5. See Alan Sokal. 1996. "Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity." *Social Text*. 46/47, pp. 217-252. See also Paul Gross and Norman Levitt. 1998. *Higher Superstition*. Baltimore: Johns Hopkins Press.

6. This question follows the argument of Ronald Inglehart. 1997. *Modernization and Postmodernization*. Princeton: Princeton University Press. More specific to this topic was the work of Jon Pammett. 1997. "Environmental Concern, Religious Belief and Faith in Science: Complementary or Antagonistic Values?" in : *Shades of Green*. Frizzell & Pammett (eds.), Ottawa: Carleton University Press, pp. 129-146.

7. For example, Chad Briggs. 1996. "The Emperor's Clothes: International Relations Theory After the Cold War." *Political and Economic Review*. Spring, pp. 1-14.

force, yet did not seem able to resolve political disputes. This is an issue of how evidence is collected and appraised, and how policies are defended based upon those ideals. Such concerns are both complicated and frustrating, for environmental politics is rife with situations where the available evidence never seems sufficient to justify political action and forge a consensus. Indeed, a good deal of the literature on this topic has pointed out that science seems unable to resolve political issues concerning the natural environment, even while faith persists that science can provide the correct answer for policy choice. As Karen Litfin observed in relation to debates on CFCs and the ozone layer,

The increasing amount of reference to science seems to be accompanied by its decreasing credibility. . . . When debates are framed in scientific terms, each confrontation may undermine the credibility of the positions and lead to the search for more scientific weapons.(8)

This situation is perplexing, to say the very least. How well does epistemology mesh with politics, and where is the crux of the problem? Two major schools of thought have developed in response to these issues, part of a highly polarised debate on the place of science in politics. One largely claims that science is the solution to these political impasses, while the other argues that science, itself, is the problem.

The Instrumentalist vision

The first, espoused by those following the logical positivist tradition, suggested that in such situations as Litfin described above, something is preventing the science from

8. Karen Litfin. 1994. *Ozone Discourses*. New York: Columbia Univ Press, p.36.

being done correctly. If only science could be done 'right', the process would be more rational and everyone would see the light of (scientific) reason. This view insists that political and social decision-making can be reduced to one best outcome. Anything diverging from what experts consider to be best is irrational.(9) This tradition relies upon the notion of foundational knowledge, the belief that one can prove everything (theoretically, at least) by reference to an unchanging external reality. This is a philosophy which not only applies to the natural world, but assumes that social and political questions can be answered in the same fashion.

According to this vision, technical experts, armed with the full information of scientific research, can establish the correct policy without regard to the specifics of the population receiving such policy.(10) Such ideas draw upon a long history of ideas in Western politics of instrumental action, whereby the legitimacy of rule is based upon the accomplishment of explicit political goals, rather than reference to a divine right to rule. Although such ideas have changed and come in several variants since Machiavelli's time, science is a central feature of such arguments.

As Yaron describes, there are three primary variants of the above argument.(11)

9. For an example of this reasoning, see Norman Levitt. 1999. *Prometheus Bedeviled: Science and the Contradictions of Contemporary Culture*. Rutgers: Rutgers University Press.

10. Helga Nowonty. 1985. "Does it Only Need Good Men to do Good Science?" in : *Science as a Commodity*. Gibbons and Wittrock (eds.), Harlow: Longman, pp. 143-145.

11. Yaron Ezrahi. 1990. *The Descent of Icarus*. Cambridge, MA: Harvard University Press, pp. 19-30.

The first, following in the tradition of Smith and Hayek, posits that people will act for the general good not by deliberate action to do so, but according to invisible and general rules which are universally valid throughout the system. Science is used to determine the characteristics of this system, by which decentralized action can then take place with minimal interventions from the state. This first tradition of thought in liberal democracies is not as consonant with instrumental action as the latter two, for the role of deliberate action is tempered by the determinants of the attributes of the system, as a whole. It is still used to varying extents, however, to justify actions in Western governments.(12)

The second tradition follows the writings of Madison, Mill, and Dewey, where science is used to illuminate the path for all individuals to act in the common good, each adjusting his or her actions accordingly to achieve the best ends as determined by science. This is the republic of active citizens, whose behaviour is governed not simply by virtue of the enlightened or divine rule by a few, but is led by the light of reason and public knowledge. One can uncover both the ends and means to those ends using science, which can then depoliticize politics to the extent that they may hold the usual passions and vices of rulers in check.(13)

The third tradition, drawing upon writers such as Thomas Hobbes, Alexander Hamilton and Jeremy Bentham, is a centralized version of enlightened rule, depending upon the conception of order as the interaction of elites within the system acting on behalf of the state's subjects. The public need not be (or cannot be) enlightened to the

12. *Ibid.*, pp. 19-20.

13. *Ibid.*, p. 20.

appropriate degree necessary for rule, and so must be led according to standards of technical competence set by science. In return, the actions of the ruling class must be transparent to those they rule, and must be clearly referenced in terms of the external benchmarks of science. This ensures that such rulers do not become despotic, for the standards to which they must aspire are extra-political and publicly accepted as just standards.(14)

Thus, the instrumentalist tradition in modern politics relies upon science as a neutral ground for either enlightenment or outside standards of behaviour, and often both conceptions of science-in-policy are used interchangeably. But such conceptions rely upon several assumptions regarding the nature of scientific research and political action, assumptions which are difficult to maintain. To make simple reference to science as a solution to political problems cannot in itself create legitimacy, unless it is also accepted in the political tradition that people should frame policies in reference to the *technical* competence of the state.

Liberal-democratic instrumentalism has tended, therefore, to encourage political actors to choose actions which are rationally and publicly justifiable in technical terms, or at least to present them as such.(15)

The experiences of the American colonists, and later the French revolutionists, reinforced the notion that they must govern personal passions and prejudices in some fashion other than by claiming divine right. By appealing to universal and immutable laws for

14. *Ibid.*, pp. 20-21.

15. *Ibid.*, p. 34.

guidance, they could hold political systems in check. All that was necessary was to frame questions in technical terms, as puzzles to be solved rather than battles to be won.

The authority of this strategy has been sustained by the illusion that social and political problems like scientific problems are inherently solvable.(16)

This is a belief that in the twentieth century developed into logical positivism, a form of thought which holds greater influence than its supposed demise in the 1950s would otherwise suggest.(17) Similar forms of political formulation existed and continue to exist in all countries, where political questions were deemed technical problems in search of expert solutions.

These processes existed because of the pervasive belief that science could bring an answer to all social problems, and that its application negated the necessity to examine all unique attributes of a situation. Science could not only provide a substitute for difficult ethical issues, but it could provide a form of control over what would otherwise be a disparate and anarchic world, one which a central authority could not otherwise understand. The application of social engineering principles, asserting that the state could manipulate and control a society in rational and deliberate ways, was in many ways an extension of the instrumental vision of politics. The particular vision in question, that of

16. *Ibid*, p. 51.

17. Michael Friedman, for example, wrote that the 'official demise' of logical positivism 'took place sometime between the publication of W.V.O. Quine's "Two Dogmas of Empiricism" (1951), and that of Thomas Kuhn's *The Structure of Scientific Revolutions* (1962).' (As quoted in: Mark A. Notturmo 2000. *Science and the Open Society*. Budapest: Central European University Press, p. 225)

enlightened elites controlling the masses with the knowledge of universal and immutable laws, presupposed a homogeneity of the world and the people who populate it. The negation of all singularities, or the ignorance of unique contexts and characteristics in political life, required that information be kept simple, and that contact with the 'real' world be limited to what reinforced that central belief. As Arendt and van Gunsteren argued, the nature of modern politics is that of alienation; not necessarily because of science, but in the name of science.(18) It is perhaps worth quoting Hayek at some length on this point when he described the role of public administrators as 'social engineers'.

So far as the solution to his engineering problem is concerned, he is not taking part in a social process in which others may make independent decisions, but lives in a separate world of his own. The application of the technique which he has mastered, of the generic rules he has been taught, indeed presuppose such complete knowledge of the objective facts; those rules refer to objective properties of the things and can be applied only after all the particular circumstances of time and place have been assembled and brought under the control of a single brain. His technique, in other words, refers to typical situations defined in terms of objective facts, not to the problem of how to find out what resources are available or what is the relative importance of different needs. He has been trained in objective properties, irrespective of the particular conditions of time and place.(19)

Hayek meant this as a severe criticism of the philosophy, but the same arguments were made in support of logical positivism by such proponents as Carnap and Neurath.(20) For

18. Hannah Arendt. 1958. *The Human Condition*. Chicago: University of Chicago Press; Herman van Gunsteren. 1976. *The Quest for Control: A Critique of the Rational-Central Rule Approach in Public Affairs*. London: John Wiley & Sons.

19. F.A. Hayek. 1979. *The Counter-Revolution of Science*. Indianapolis: Liberty Fund Press, pp. 168-169.

20. See A.J. Ayer (ed.) 1959. *Logical Positivism*. Los Angeles: University of California

them, removing administrators from the peculiarities of time and place was a benefit, and their judgement upon that basis was desirable.

According to their logic, the application of universal laws was both necessary and just, for discretion could not be properly held by those working within government, particularly bureaucracies. Public administrators were not directly accountable to the people even in democracies, yet the growth of such administration in the twentieth century required some form of justification. Logical positivism provided just that basis for authority. The third variant of the instrumental vision described above, of enlightened rulers acting on behalf of others, came to be seen in both liberal-democratic and authoritarian states as legitimate. Political authorities could take action on behalf of others because they had the technical knowledge and expertise to do so, and this was a universal knowledge which would always remain objective. Indeed, for them, knowledge only could be objective if it were universal, and from their perspectives, they were not even dealing with political issues.(21)

The consequences of this view were straightforward. Politics came to be viewed as something avoidable, and a matter which could be averted if only people relied more upon science and the experts who controlled it. Science not only provided an objective and universal account of physical and social realities, but its application to political questions was certain. If one framed problems in technical terms and answered them in a

20.(...continued)
Press.

21. A.F. Spilhaus. 1980. "Societies Must Shun Politics, Act Only on Scientific Issues." *Chemical and Engineering News*. 58 (April 21), pp. 43-44.

technical manner, then they could essentially circumvent the awkward process of politics. Hence, scientific rationality could be used to control political rationality, and logical positivism insisted that the two should be made essentially similar. If a solution could not be found to a political problem, it was likely that one could alleviate the uncertainty through the application of ever more research into the area. With science applied to politics, uncertainty should not exist and a consensus should.

This was not simply a philosophy which held sway in certain academic circles over certain years; it has also become enshrined in law, and forms the basis for much of legal and political rationality. It was done so because it was convenient, particularly in issues of environmental politics. Whenever action was desirable, evidence could be presented in favour of that action and then claimed that it was beyond discussion. If one did not want any action to take place, they needed only point out the uncertainty associated with any evidence and then state that nothing could be done until 'we are certain'. Essentially, logical positivism maintained that political actions could be justified in reference to unquestionable beliefs.

Post-modernism and the politics of science

Critics of this view of government and authority of knowledge have always existed. Many were superstitious and did not believe that science provided suitable answers to any question, while others were worried about the consequences of technological progress upon society. A number of learned writers pointed out that

deferring to authority was always a dangerous enterprise, for it conferred a form of power which political officials could easily corrupt. Many of Orwell's writings reflected this fear, while President Eisenhower's farewell address to the US was a frank warning against allowing too much scientific authority to be left to the state. Reflecting on the relationship between science and policy, he said,

Yet, in holding scientific research and discovery in respect, as we should, we must also be alert to the equal and opposite danger that public policy could itself become the captive of a scientific-technological elite.(22)

These warnings reflected the realization that experts may not always be honest, or that objectivity when applied to policy may not be entirely universal.

In many academic circles, however, the criticism of science and politics did not stop there. Academic methodologies for studying science since the 1960s and 1970s went beyond questions regarding the political influence on science, and instead posed more philosophical questions about the ability of science to hold authority over any topic.

Although perhaps a reflection upon the radicalism of the 1960s and a desire to oppose the older methodologies in the sociology of science, such criticisms have by now become the norm in university-level studies. The opposing side to the instrumentalist vision of science has been loosely termed the 'cultural constructivists' by writers such as Gross and Levitt(23), although such a characterization somewhat misleadingly combines two

22. Dwight Eisenhower. 1961. Eisenhower's Farewell Address to the Nation, 17 January 1961.

23. Gross and Levitt. 1998, *op.cit.*

distinct critiques of science with rather different philosophical backgrounds. Many interpreted the arguments of 'post-modernists' as meaning that science did not describe reality, so much as the powers-that-be fabricated it to conform with prevailing doctrines. Science was ideological, not objective, and was a process by which the state could exert and spread its control over knowledge (and, by extension, people as well).

If political disputes were unresolvable when science was involved, then this was because the science used was, itself, political. This form of analysis essentially agreed with the logical positivists that scientific and political rationality could be the same, but simply reversed the manner in which the control was exerted. Rather than science controlling politics, the politics would control the science. Within this line of thought, it was not possible for one belief to be more true than another, for 'facts' were little more than 'truth-claims' which were legitimated by political power. To say that one belief was 'more true' than another was an attempt to impose one's world-view on another, and the substantive question of whether something was true or not was both meaningless and irrelevant. To term something as 'scientific' was little more than a rhetorical flourish which gave voice to one view while silencing an equally valid alternative.

A number of post-modern writers have been intimately involved in the 'science wars', and their arguments have been widely cited in support of social constructivists. Post-modern writers raise legitimate issues relating to language and knowledge, but these considerations are often lost among other concerns. Not all post-modern or post-structuralist writers agree that science is completely fabricated, or that it has no relationship to the world around us. Some writers argue that although foundationalism

does not exist, this is no reason to abandon the idea of objectivity.(24) To claim that a distinct school of thought known as 'post-modernism' even exists is difficult, let alone categorize specific arguments from such a group. Therefore, rather than make the implication that the methodological assumptions in this thesis oppose post-modernism, it is more accurate to say that they operate in contrast to the social construction ideas which follow in the wake of Kuhn's work.

Kuhn and social construction

The social constructivist school emerged from a tradition of science studies (or sociology of science) which in the 1960s took a turn against the more traditional views of the so-called Mertonian school. This older tradition, named after R.K. Merton, had long admitted that social factors influence the conduct of science, but wished to restrict study of the actual content of the scientific research. That is, one could study social influences on what line of research developed as opposed to another research programme, but the truths or falsities of the actual claims were left to the scientists, themselves.(25) What Merton and colleagues were following was a form of 'weak constructivism', which admitted that social factors influenced the direction of science, but not necessarily its methodology. Although this line of thought did not necessarily emerge from logical positivism, it also did not oppose such ideas.

24. See Helen Longino. 1990. *Science as Social Knowledge*. Princeton: Princeton University Press. These ideas will be explained more fully in Chapters 2 and 3.

25. For example, R. K. Merton. 1970. *Science, Technology, and Society in Seventeenth-Century England*. New York: Howard Fertig.

In the early 1960s a new school of thought emerged, one which is now entirely dominant in the sociology of studies field.(26) This school claimed to oppose both the older Mertonians and the logical positivists, first by denying any foundation of knowledge in epistemology, and then by allowing study of the actual content of science. Thomas Kuhn's work relied upon the notion of 'paradigms' in science, overarching world-views within which science operated in a doctrinal manner. There was nothing inherently rational about these doctrines or the manner in which they were chosen, yet they persisted because experts suppressed criticism of these views and consciously excluded most from the processes of deliberation. The operation of 'normal science', the day-to-day research undertaken by most scientists, was little more than puzzle-solving within an unquestioned and unquestionable paradigm. Only exceptional scientists can change the paradigm, and then only in times of crisis regarding legitimacy.

An important point Kuhn made was to argue that the choice of one paradigm or another was not a matter of 'rationality' or science. If the evidence were always insufficient to prove one theory over another, then one could only ever make choice of theories on faith.

The man who embraces a new paradigm at an early stage must often do so in defiance of the evidence provided by problem-solving. He must, that is, have faith that the new paradigm will succeed with the many large problems that confront it, knowing only that the older paradigm has failed with a few. A decision of that

26. Most of this literature can be traced back to the 1962 work of Thomas Kuhn. 1996. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.

kind can only be made on faith.(27)

In other words, if evidence could not act as reason enough for choice of scientific theories, then the social factors must do more than simply influence the direction of research. Rather, social and political factors could determine the *content* of science, as well. Whether one theory was chosen rather than another could be reduced to the political or social backgrounds of the people involved, regardless of the personal accounts made by the scientists, themselves.(28) The sociological factors involved could even be considered more important than questions of scientific methodology.

Even while removing the taboo against studying the content of science, the social constructivist school did impose one rule upon studies of science- symmetry. Symmetry in science studies maintained that one was not to pass judgement on what is science and what is not, because assessing the social claims of all sides equally allowed for greater fairness. As Dorothy Nelkin put it,

“the role of social and philosophical studies of science and technology” is not “to reveal the rights and wrongs of policy choice,” but only “to understand . . . to interpret . . . to draw a coherent picture of what is going on.”(29)

Many may perceive this as a measure of fairness, to allow voice to those not normally

27. *Ibid.*, p. 158.

28. For example, Bruno Latour and Steve Woolgar. 1979. *Laboratory Life*. Berkeley: Sage Publications.

29. As quoted in: Kristin Shrader-Frechette. 1985. *Science Policy, Ethics, and Economic Methodology*. Dordrecht, Netherlands: D. Reidel Publishers, p. 68.

heard in political disputes. If 'true' science were simply a matter of pushing political boundaries, then accepting such values of science did not allow for analysis of those whose works might not be considered professional enough. Any defence of science was a defence of the elitism which created technocratic systems. To subscribe to the methodological values of scientific work was to ally oneself with dominant political powers, and the authority of technicism.

According to the logic of the sociological analyses, there was no foundation for knowledge, and paradigms were chosen more for political/social reasons than those pertaining to scientific methodology. Consequently, something was considered scientific for no other reason than enough experts considered it so, and these elites were able to impose censorship upon related criticism. Or as Kuhn put it himself, "it is precisely the abandonment of critical discourse that marks the transition to a science." (30) It was therefore possible for pseudo-scientific theories to be legitimated by the same social processes as those considered scientific.

For example, in the work of Collins and Pinch in studying the existence of psychic phenomena, they posited that the existence of a purely social process of legitimation meant that neither side had any better claim to truth or validity. Their article "The Construction of the Paranormal: Nothing Unscientific is Happening," argued that "the 'actual existence' of paranormal phenomena is redundant and that their position on the existence of the phenomena is neutral." They claimed they were more interested in the

30. Thomas Kuhn. 1970. "Logic of Discovery or Psychology of Research?" in : *Criticism and the Growth of Knowledge*. Lakatos and Musgrave (eds.), Cambridge: Cambridge University Press, p. 6.

ways in which the controversy played out between the paranormal and traditional scientists, as a way of illustrating how scientific theories came to be legitimated.(31)

Against logical positivism: why science cannot settle policy

In this form of argument, it might become possible to see how one might see the two traditions of post-structuralism and social constructivism as similar. In a way they support one another, for the Kuhnian admonition not to pass judgement on science versus non-science works well for those who see little difference between the two. In some ways, then, their conclusions are quite similar. Both believe that there is no foundation for knowledge, that something other than the internal logic of science influences or determines the content of scientific theories, and that these theories or paradigms are legitimated by political means. The social constructivists may be more interested in epistemological questions, while the post-structuralists may be more interested in notions of ideology.(32) Whatever the case, the idea that science studies should be symmetrical allows the relativist notions of indeterminate truth to be taken seriously by those sociologists. Indeed, one of the founders of the 'strong programme' of sociology of science argued that we should afford no epistemological privilege to science, and that the burden of proof was upon the scientists to prove that they were doing anything

31. H. Collins and T. Pinch. 1979. "The Construction of the Paranormal: Nothing Unscientific is Happening", in : *On the Margins of Science: The Social Construction of Rejected Knowledge*. Roy Wallis (ed), Keele: University of Keele Press, pp. 237-270 .

32. Ulica Segerstråle. 2000. *Defenders of the Truth*. Oxford: Oxford University Press, pp. 333-339.

worthwhile.(33)

The point that Kuhn and others have made regarding those inspired/influenced by logical positivism is that Carnap and others accepted science as essentially infallible. That is, no one in this tradition questions the truth of science, for they strongly believed in the correspondence theory of truth. This theory holds that science uncovers truth merely through its description of reality; nothing else is required, for this description will be an accurate representation of what is simply true. If a scientific finding says that a given policy is the most rational, then this is true, and one cannot argue the point further. This is what leads to the general refusal to accept uncertainty, and the attempts to cover it up when it appears.

Some authors have concluded that it is unwise to assume that scientific reports produced in support of a policy direction/action are sound and are not biased.(34) One can either change conclusions to support a particular outcome, or those conclusions which would prove uncomfortable can be removed.(35) The constructivists' argument that values do matter in the content of science does perhaps have some validity then, and this would go a long way toward explaining why political disputes cannot be resolved by science. If the science itself is political, then we can never remove it from political

33. *Ibid.*

34. Robert E. Moran. 2000. "Is This Number to Your Liking? Water Quality Predictions in Mining Impact Studies", in : *Prediction*. Sarewitz, Pielke, and Byerly (eds.), Washington, DC: Island Press, pp. 185-198.

35. Charles W. Heckman. 1984. "Telling Them what They Want to Hear." *The Ecologist*. 14, 4, pp. 153-155.

debates.

Even if a scientific study can claim that one outcome is more likely than another, this does not, in itself, give any indication of which outcome is the more desirable.(36) Rather, when people claim that their choice of action is scientifically justified, all this means is that the outcome they valued most was the predicted outcome of a given action. Environmental sciences cannot, by themselves, solve controversial issues. Issues which can be incontrovertibly solved by reference to science are not, by definition, controversies. Science can only answer those questions posed to it, although one can frame the question in such a way that it presupposes a valued conclusion.(37) To leave ethical and social questions to scientific research is not to leave its determination to disinterested, neutral facts.

On this point the critics of logical positivism (and many such critics exist) are essentially correct, when they point out that to rely upon science as infallible creates both an impossible goal and heightened expectations. There is a danger, however, in accepting a constructivist/post-structuralist approach, which includes the line of thought predominant in contemporary sociology of science studies. Even while disagreeing with the logical positivists regarding how to apply science to politics, it is not necessary to accept all of the arguments made by such influential writers as Kuhn, Latour, and

36. Lynn Maguire. 1994. "Science, Values, and Uncertainty: A Critique of the Wildlands Project", in: *Environmental Policy and Biodiversity*. Grumbine (ed.), Washington, DC: Island Press pp. 267-272.

37. This is a matter of defining political issues as technical/scientific ones, which will be addressed in the next chapter.

Jasasnoff. Although we must address the importance of values and the lack of foundations of knowledge, policy analysis is not well suited to either the symmetrical approach to science studies or the conclusions such writers reached regarding the indeterminacy of truth. Despite its popularity, neither logical positivism nor constructivism were entirely appropriate tools of analysis for this research.

Criticisms of the constructivist school

It must be admitted that no significant problems with the constructivist school were anticipated while first undertaking this research. The critiques of logical positivism were well known and widely acknowledged, so I therefore assumed that constructivism would be an appropriate method of analysis for this research. Two major difficulties arose in attempting to apply constructivism to these questions of how science cannot settle policy questions, difficulties shared in common with logical positivism. Aside from the excessively broad scope of the original research in this thesis (in terms of examining entire countries and their ways of framing science debates), the term 'science' itself was difficult to define. This particular difficulty was anticipated. However, the second obstacle put the basic aims of the research into serious question. This second difficulty was that, in examining the actual workings of science within administrative institutions, it began to emerge that not all the work done within these agencies was, in fact, science. What often passed for science in water management agencies, at least the information used in decision-making processes, could only be considered scientific by an extremely

broad and generous definition. Although such a definition should have meshed well with a discourse analysis approach, I was uneasy with the implications that such use would create. By assuming that scientific work within administration remained scientific (or by assuming that such distinctions did not matter), I would be implicitly lending authority to arguments made by political authorities. Indeed, I began this research with the good-faith assumption that one could generally count upon governments not to engage in systematic fraud and suppression of evidence.

Upon encountering the work of the whistleblowers' group Public Employees for Environmental Responsibility (PEER) in the US and the writings of Todd Wilkinson (whose research was supported by PEER), another side of the 'science wars' emerged.⁽³⁸⁾ Rather than questions of truth and epistemology existing purely within the academy, widespread allegations of data suppression, threats of violence, and administrative manoeuvring had been recorded.⁽³⁹⁾ Questions of validity of evidence were being played out by more than simply 'discourses', and the sociology of science literature did not appear to fully engage with this larger scope of political conflicts fully.⁽⁴⁰⁾ This meant that although notions of 'power' were being studied in reference to

38. Todd Wilkinson. 1998. *Science Under Siege*. Boulder: Johnson Books.

39. Jeffrey A. Hutchings, et. al. 1997. "Is scientific inquiry compatible with government information control?" *Canadian Journal of Fisheries and Aquatic Sciences*. 54, pp. 1198-1210; Public Employees for Environmental Responsibility (PEER). 1997. *Grizzly Science: Grizzly Bear Biology in the Greater Yellowstone*. PEER White Paper #19, October 1997.

40. Brian Martin. 1993. "The Critique of Science Becomes Academic." *Science, Technology and Human Values*. 18, 2, pp. 247-259.

scientific work, sociologists of science would often miss the more practical and immediate consequences of political control over science. If the study being undertaken could have political effects of its own, then it was both immodest and somewhat dangerous to assume that such an analysis could remain detached and neutral, unless the scope of inquiry were so severely restricted that it ignored the larger political issues at stake in the relevant case studies.⁽⁴¹⁾ A symmetrical approach to science studies, one that withheld judgement upon the validity of science versus pseudo-science, did not seem as if it would work well in such a politically charged policy arena.

Against symmetry

Even if one admits that politics cannot be left to science, this explanation does not necessarily mean that the constructivists or post-structuralists are correct in claiming that the call for symmetrical analyses of science creates an atmosphere of fairness. On the contrary, holding to a symmetrical analysis lends more credence to the side with a weaker argument, even if this happens to be the wealthier or more powerful actor. By assuming that the authority of scientific arguments relies upon political shaping of the 'truth', one may easily overlook occasions when scientific research is not supported by dominant powers. The environmental movement has a long history of such occurrences (of which Rachel Carson's work is perhaps the most well known). The very term 'fairness' implies concepts of judgement on the truth of an issue.

Rather than being a measure of fairness or objectivity, I would argue that

41. Shrader-Frechette. 1985, *op.cit.*

symmetrical analyses are more a matter of being uncritical. In this sense, constructivism has something in common with logical positivism, save that rather than being uncritical of science, constructivism is uncritical of theories which are not scientific. To give equal footing to opposing views without critically appraising them may lend disproportionate authority to one, and to restrict such criticism is akin to saying that no difference exists between the two. In fact, this is what has happened in a number of studies, whose conclusions have been enlisted to support pseudo-scientific theories such as paranormal research and ufology.⁽⁴²⁾ Inasmuch as the Kuhnians criticized the earlier Mertonians for their lack of neutrality (since they refused to evaluate scientific studies), the same should hold true for anyone who implicitly accepts any other 'truth-claim'.

This is especially problematic in the area of environmental policy covered in this research. If policies which are damaging to the environment have been justified on the basis of information which simply appears to be scientific, yet is actually nothing of the sort, then of what use is social constructivism? By focussing so intently upon issues of epistemology, or by believing that social values always have primacy in determining the content of science, researchers can lose sight of the larger problems involved.⁽⁴³⁾ Rather than blaming policies or actions upon some general category called 'science', one should be able to pinpoint the source of political troubles.

Sian Sullivan cites an example she used as the basis for her research in Namibia.

42. Pam Scott, et. al. 1990. "Captives of Controversy: The Myth of the Neutral Social Science Researcher in Contemporary Scientific Controversies." *Science, Technology, and Human Values*. 15, 4, pp. 474-494.

43. Martin. 1993, *op. cit.*

The belief in desertification held by western governments formed the basis for many development policies in the region, and forced locals to change their behaviour contrary to what their local knowledge was saying should be done at a particular time. The constructivist analysis of such a situation was that western governments, using their power through scientific studies, were imposing policies upon the people of Namibia. If only local knowledge could be given equal footing with science, then the situation would improve. What Sullivan discovered was that, in fact, no scientific studies had ever been done on desertification in Namibia. What development agencies had termed scientific was actually nothing of the sort, for no empirical work had ever been done, and they instead based the theories of desertification on hearsay. Her own ecological research discovered that, when she finally carried out empirical studies, they essentially agreed with the local knowledge of the situation.(44)

Without such a consideration of whether the information or the political actors themselves were to blame (rather than considering them to be the same), these important social questions regarding science and policy cannot be resolved. The importance in detailing whether or not science is used in a particular situation relates to where culpability for policy impasses lay. If we know that the information used is purely manipulated then a better scientific base might improve the process, although this is by no means certain. More importantly, however, it shifts blame for failure of policy from

44. Sian Sullivan. 2000. "Getting the science right, or introducing science in the first place? Local 'facts', global discourse - 'desertification' in north-west Namibia", in : *Political Ecology: Myth, Science and Power*. Stott and Sullivan (eds.), London: Edward Arnold.

science onto the central hierarchical administration of the state, which hides from political accountability behind its facade of pseudo-scientific technicism.

The problem then can be defined differently. Rather than being perceived as a lack of objectivity in science, we can trace the failure of policy to manipulation of information and goal displacement. This means that the nature of scientific uncertainty should be recognized and incorporated into decision-making, for efforts to alleviate its presence while continuing to assert that it should not exist, can only harm both science and politics. The social constructivists are correct in asserting that the process of science in policy is often entirely political. Where they err is in assuming that what was used within that process was, in fact, science.

Symmetry and the inability to study policy

Embedded within symmetrical analyses is the assumption that politics, or contextual values, are the only means of settling disputes in science and determining the acceptability and objectivity of theories. Were this true, then it would follow that making judgements of science would be a purely ideological exercise. But if one believes that evidence plays a role, that scientists do not simply dictate reality to others, then the conclusion is far different.⁽⁴⁵⁾ Rather than attempting to remain neutral in evaluation of science, such an approach will only help to serve existing dominant interests and political/economic powers.

45. The same argument of neutrality is made by those who claim that science is value-neutral, and that its objectivity is not to be questioned.

To attempt to be 'neutral' in waters already muddled by unavoidable politics is simply to serve the implicit or most powerful political values already present.(46)

In other words, to claim that the setting of boundaries by scientists is purely political (or to uncritically accept any judgement from scientists), leaves out important questions concerning the evaluation of evidence, and whether or not what the government asserts has any relation to existing conditions.

If all science is determined by political acceptability, then that is how it is to be evaluated, as well. But such an approach precludes the possibility of less politically powerful groups from having any say in the policy process, unless they simply waited until their views became more politically 'acceptable.' The political implications of the so-called 'strong programme' of sociology are every bit as troubling as what they accuse the traditional positivists of. Even while supposedly attempting to level the playing field for discourse politics, relativist accounts of science implicitly endorse dominant political powers, without any recourse to refuting their claims.

Others have made similar arguments elsewhere. Writers like David Harvey have complained that the conservative quietism of the postmodern approaches leads to overly narrow foci being used in addressing social issues.(47) If 'social' is defined narrowly so as only to encompass those working within a laboratory setting, then larger issues of the

46. Shrader-Frechette. 1985, *op.cit.*, pp. 84-85.

47. David Harvey. 1992. "Postmodern morality plays." *Antipode*. 24, pp. 300-326.

context of science and its applications cannot be considered.(48) This local fixation came about because of a growing preoccupation among those in the sociology of science with epistemological issues. Rather than using the impact of science on society and how we might change things for the better, there grew an ever-increasing fascination with what Brain Martin characterizes as “antiseptic concerns” about negotiation among scientists and the role of the sociologists among scientists.(49) With a focus upon the indeterminacy of truth and a scope limited to the micro-sociological accounts of laboratories, much of the sociology of science literature has lost touch with its earlier roots of concerns with overly technocratic and unaccountable government. One may argue that this focus and scale are necessary, however, in order for any claim to symmetrical analyses to be made. Any contact with larger social processes and policy might well ‘contaminate’ the research, by forcing one to take sides on an issue.

As a direct result of such limitations, attempts at neutral analysis do not allow for proper study of the policy process. The reason for this is that approaches to sociological accounts of science-in-policy often posit that outcomes are essentially predetermined, not by nature, but by the values and ideologies of the scientists. The process studied focusses upon negotiation among networks of actors in the area of study, but they evaluate the end results of such impacts upon the policy process often only in terms of the negotiation. Where one stands ideologically determines how the scientific models and evidence are

48. David Demeritt. 1996. “Social theory and the reconstruction of science and geography.” *Transactions of the Institute of British Geographers*. 21, pp. 484-503.

49. Martin. 1993, *op.cit.*

marshalled, at least if one assumes that what is happening in the background is, in fact, science. If we make no distinction between science and simple information manipulation, then the policy is evaluated based upon the acceptability of its outcome or the ideological positions of the actors. This leaves out many important variables and external considerations in how science in policy actually operates.

Such ideological analyses had serious effects upon scientists living in the Soviet Union, especially in the biological sciences while under the influence of Trofim Lysenko. With many careers (and more than a few lives) ended based on the ideological acceptability of research, Soviet authorities strongly believed that contextual values *alone* could govern the truth of scientific theories.⁽⁵⁰⁾ By claiming that Mendelian genetics was neither suitable for dialectical materialism nor 'proletarian science', Lysenko forced the formerly debunked Lamarckian conception of genetics upon the scientific community. The Soviets upheld this for many years, even in the face of mounting evidence that they could never prove nor put such beliefs into practice. What is most surprising, under such conditions, is that any preservation of alternative values was possible, values which in their own way allowed for ecological research not deemed appropriate by the state.⁽⁵¹⁾

Many constructivist analyses of this era considered questions of the truth or falsity of Lysenko's claims to be matters that could be determined without reference to science. For example, in describing the role of Lysenko in Soviet biological sciences, Murdoch

50. Loren R. Graham. 1998. *What Have We Learned About Science and Technology from the Russian Experience?* Stanford: Stanford University Press.

51. See Douglas Weiner. 1999. *A Little Corner of Freedom: Russian Nature Protection from Stalin to Gorbachev*. Berkeley: University of California Press

and Clark claim that his theories of Lamarckian genetics, although not willingly accepted by scientists, did not in any way affect Soviet crop production. This is used as proof of the claim that outcomes may correspond with representation (i.e., Lysenko's ideas), even though this constructed representation may be rejected by 'orthodox' science.⁽⁵²⁾ In other words, if there was no change in crop production, then Lysenko's theories must have been as valid as any other. They thus evaluate the impacts of Lysenko's theories, not in terms of the validity of such models or the process by which they came to dominate, but only in terms of Soviet crop production levels. The validity of the knowledge itself is considered indeterminate, and the process of negotiation is not judged.

The trouble with making such a claim is that it patently ignores the processes by which Lysenko's ideas came to be accepted (by violence), and the reasons why crop production may have been what they were. As Graham's appraisal of Soviet history clarifies, forced collectivization and the possible political appeal of 'proletarian science' motivated peasants to work in certain ways, but it in no way validated Lysenko's theories, and they should not be considered as accurate as more accepted scientific views.

Whatever the case, crop production was nowhere as high as it had been before collectivization, when more scientifically accepted ideas (as local knowledge) were employed.⁽⁵³⁾ The problem with the approach which Murdoch and Clark took is that even if one manages to avoid purely ideological appraisals (e.g., saying that Lysenko was

52. Jonathon Murdoch and Judy Clark. 1993. *Sustainable Knowledge*. Paper presented to the European Rural Sociology Conference. Wageningen, August 1993, p. 29.

53. Graham. 1998, *op.cit.*, pp. 19-21.

right or wrong in reference to his Stalinism), outcomes are rarely what they seem, and are not always the most important component of the policy. One cannot claim that a theory is correct or as valid as any other, purely in reference to the outcome of policies which that theory claims to support. To do so relies too heavily upon traditional and (I would argue) outmoded notions of policy analysis. Such analyses rely upon simple causality in political processes, and so fall into the *post hoc, ergo prompter hoc* (what came after, was therefore determined by) fallacy.

If as Majone writes, traditional policy analysis is concerned primarily with outcomes, not process, then science studies which do not attempt to evaluate the rightness or wrongness of scientific research are perhaps more traditional and blinkered than they could be otherwise.⁽⁵⁴⁾ Particularly in systems where issues of democratic accountability are at stake, issues of process can often be more important than the associated outcomes. Failure to judge the scientific versus pseudo-scientific status of claims may result in that very condition for which critical sociologists of knowledge criticize the older, Mertonian school. Namely, they may implicitly accept that theories are accurate, and then judge associated policy solely on the basis of the outcomes of that policy.

To attempt this is a mistake, for it falls into the trap of instrumental action in politics, or the belief that knowledge is used in the direct service of certain, predetermined goals. That such a construction of political action does not exist in reality poses a problem, for evaluations can only be made if background assumptions are correct. Due to the highly uncertain and complex nature of the problems in environmental policy,

54. Majone. 1989, *op.cit.*, pp. 11-18.

unintended outcomes and administrative ‘muddling-through’ are often prevalent. Goals are not set out in advance, the actual outcome of a policy is rarely what actors intended, and even assuming that intentions were known at the time of policy creation is highly problematic. In addition, actors within the same institution routinely follow conflicting goals, multiple lines of authority, and restricted access to information.(55)

This alludes to a great difficulty in assessing science in policy. If such analyses focus primarily upon the outcomes of policy, assuming that science was tailored to fit the policy goals of the state, then several assumptions are made. One must assume that the state knew what its goals were from the very beginning, which is generally only true in a vague sense. It then goes on to assume that the final policy outcome was a direct reflection upon those goals; in other words, it was a purely rational policy. Other assumptions, such as those of a unitary actor and the benefit of full information, are also involved.(56) As political scientists have dispelled such assumptions in policy for some time now, we should not uncritically allow them in this present analysis. Rather, it is important to look at the process of information exchange and use in policy and, in particular, the attempted use of scientific research.

The importance in setting out this research lay in the false conclusions that may be drawn if these issues of science are continually presented in black and white terms. The relativists have rightly pointed out the problems inherent in considering all science (or

55. James G. March. 1988. “Bounded rationality, ambiguity, and the engineering of choice”, in: *Decisions and Organizations*. March (ed.), Oxford: Blackwell Publishing, pp. 266-293.

56. Majone. 1989, *op. cit.*

what passes for science) to be accurate and useful without question, but considering all science to be politically motivated is equally dangerous. Without some notion of authoritative knowledge concerning an empirical world, state policies are doomed to the very politicization for which they are currently criticized. They will have every incentive to fulfil Nietzsche's prophecy of how modern states' need of legitimation begets their own delegitimation, while undermining the ability of social and political groups to oppose environmentally damaging policies effectively.

For groups opposing state dam projects, as illustrated in the case studies, hope of effective opposition lay not in laying blame for these very policies entirely upon some mysterious body known collectively as 'science', but rather in recognizing that scientific research is a tool to be used by either side. The key is in recognizing when claims to or criticisms of 'science' are nothing of the sort, when they hide alternative goals and political values from the realm of public discussion. Such acts of 'goal displacement' are inherently undemocratic, and undermine the legitimacy of both science and the governments which claim to use such research. Improvement in the analysis of scientific research will not solve conflicts automatically, nor will such research illuminate the one policy option to which all will readily agree. No assumption is made that such a conflict-free world is either attainable or desirable. But in establishing broader guidelines for research and decision-making, the policy process can both reassess its goals to better conform to public sentiment, as well as improving the ability of valid research to be part of the process.

Rather than blaming such political failings on science itself, this thesis will argue

that much of what passes as scientific work within administrative agencies is actually nothing of the sort. Thus, the question should not be whether science has epistemological validity in policy, but whether it is used at all. That is, is science appropriate (applicable) in certain cases, or even present in others? Consideration of these questions requires that a suitable definition of science be provided, one that explains fully the philosophical differences I hold between logical positivism and the constructivist schools, as well as providing a template that can be used for evaluating environmental policy. This discussion should begin with consideration of the major fault I find with both the 'traditional' and 'radical' definitions of science commonly used- the fixation upon truth as an end goal of inquiry.

Chapter Two

The Meaning of Science and Search for Truth

The task of science is not to discover infinite wisdom, but to limit infinite error.

-Bertold Brecht

Science is a long history of learning how not to fool ourselves.

-Richard Feynman

Science and Rationality

Muddled Definitions

The role of science and rationality in policy is often a clouded one, although it may be clouded more by the manner than the amount of debate on the subject. 'Science' is highly problematic because it eludes precise definition. The concept has become mythologised over time, almost literally as a manner of Promethean discovery and mastery over nature. Whether for good or ill, science has had an enormous impact, and it is for this very reason that defining the term is extraordinarily difficult. Like 'fascism' or 'democracy', science may at once refer to everything or particulars, be used as a pejorative term or one of high praise. In politics, it may be used by some as a source of legitimation while its invocation breeds suspicion and mistrust among critics.

These dual meanings often cast about in discussions do little to resolve the use of science in policy. A strong public desire exists to use science in determining political decisions, and faith remains high that scientific research will find solutions to both

political impasses and technical problems.(1) At the same time, however, suspicion toward expert rule-making and disappointment in the ability of science to predict and control events has led many to feel alienated from the political process. This cynicism toward science and modernity often exists alongside faith in progress and a dependence upon science and technology. This apparent dualism in thought, that people may trust science and rationality while at the same time they are suspicious of it, has led some to believe that science and rationality have no new answers to offer us.

Such a blanket condemnation of science and rationality is misleading, because the mere use of aggregate terms like “science and rationality” bundle together several definitions, blurring the important distinctions between them. ‘Science’ may mean several things at once, referring alternately to research, professions, technology, or general world-views of a mechanistic universe. ‘Rationality’ is similarly muddled, and its frequent use in tandem with ‘science’ is curious. The term may at once mean something scientific or political, associated with either research or decision-making, but there seems to exist an assumption that one cannot exist without the other. Unless this implies that those who know little of science always act irrationally, or that there is such a thing as irrational science, then the manner in which English-speaking people describe science lacks consistency.(2)

1. National Science Foundation. 1998. *Science and Engineering Indicators, 1998*. Washington, D.C.: National Science Foundation Press, pp. 7/11-7/15.

2. These terms are used differently in other languages. ‘Science’ in Norwegian (*vitenskap*- literally translated meaning ‘wardrobe of knowledge’) is not used interchangeably with rationality (*rasjonell* or *fornuftig*- rational or common sensical).

(continued...)

Part of this confusion stems not only from the wide range of definitions used in common language, but also in the various ways in which science has been defined by philosophical and theoretical traditions. Science as a method of explanation is very different from the idea of science as a form of political power, and these are also distinct from the idea of science as a form of critical inquiry. As mentioned in the previous chapter, the two dominant schools of thought in philosophy of science, the logical positivists and social constructivists, share very different views of how science is produced and how one demarcates between science and non-science. According to the logical positivists, science is the manner in which one uses logical statements in conjunction with experiments to prove or verify a statement. It is, in other words, a way of finding the truth or falsity of any given statement.⁽³⁾ In contrast, the social constructivists would say that truth is indeterminate, so therefore science is nothing more than a way to impose upon others a way of understanding the world, one which is not to be questioned. It may have some close semblance to reality, but since reality can never be conclusively described such distinctions between 'better' and 'worse' theories are considered meaningless.

Although these two conceptions of science seem very different, they hold one

2.(...continued)

'Science' in Hungarian, *tudomány* (again derived from the term 'knowledge'), is similarly not confused with *ésszerűség* (rationality). English terms both derive from Latin roots, *scientia* (knowledge) and *ratio* (reckoning), but their nuances in use seem to have been lost.

3. It is also possible for a statement to be considered 'meaningless' if it cannot be either proven nor disproven. Such is the case with research involving any non-observable entities.

view in common. This common view is that truth is a desirable goal, or one that should be considered the highest ideal by scientific research and the scientists so concerned. The difference, of course, is that logical positivists consider truth to be an achievable goal, while constructivists claim that truth is ultimately indeterminate. Although I would side with the constructivists on this matter, what is most important is that the issue of truth and its attainability still seems to be a central component of both schools. This fixation upon the truth is a serious impediment to science as applied to policy situations, and it is upon this view that I will begin to elaborate an alternative definition of science, one more in common with the school of American Pragmatism. In order to best illustrate how such a definition works in practice, it will be explained in terms of how scientific research can go wrong, and how therefore 'bad' science can be identified.

The Problem of Fixating upon Truth

The definition used in this research shares common ideals with both the earlier positivists and later constructivists. Like the logical positivists, science is concerned with the pursuit of truth and the attempt to closely model reality. But in line with the constructivists, no assumption is made that truth is an attainable ideal, or that it is ever possible to conclusively 'prove' a scientific theory. Although this may, at first glance, seem to be a contradiction, no incongruity need exist. Several reasons exist why such a centrist view of science is possible, starting first with the disavowal of truth as an end goal.

How can one pursue truth, admit that attaining it is not possible, and then claim

that it is not a final goal? The answer to this lies in making a distinction between the rationality of the *process* of believing something to be true, and the truth of the *content* of such a belief. When it comes to discussions of truth, these two schools speak of justifying two very different things. The logical positivists are concerned with justifying the truth of statements, or the content of beliefs, while the constructivists are more concerned with the truth (or rationality, which confuses matters further) in believing something to be true. As Notturmo argues, Cartesian epistemology has led us to conflate the two concepts, since Descartes considered that a person was only acting properly in believing something to be true if the content of that belief had already been proven to be true. This leads to a perplexing situation, for as Notturmo writes,

We are led by argument to the conclusion that we cannot justify the truth of statements. But we believe that we are, ourselves, rational in believing them. Since we believe that we are rational, we conclude that we are justified. And since we believe that we are justified, we conclude that the statements that we believe are justified too.(4)

This dilemma occurs because it is difficult to comprehend that we may be rational in believing something which is not necessarily true. If we are rational, so we are led to believe that our beliefs must be true. But if we believe that only one truth exists, then anyone who disagrees is acting irrationally, because they are basing such arguments upon untruths which contradict our own.

This leads some to conclude that truth is whatever most people agree upon or are

4. Mark Notturmo. 2000. *Science and the Open Society*. Budapest: Central European University Press, p. 84.

forced to believe. However, statements are not true simply because many people believe in them. Likewise, people are not necessarily irrational for believing that they are true. In other words, rationality and science are not necessarily the same thing, for science can be irrational while rationality can be unreal. Mistaking the two can lead to great confusion, as has been the case with the 'science wars' of the past decade. For example, take the following quotation from Segerstråle:

[Richard Dawkins] once asked a social scientist the following question: 'Suppose there is a tribe which believes that the moon is an old calabash tossed just above the treetops. Are you saying that this tribe's belief is just as true as our scientific belief that the moon is a large Earth satellite about a quarter of a million miles away?' The social scientist's reply was that truth is a social construct and therefore the tribe's view of the moon is just as true as ours. This made Dawkins wonder why sociologists or literary critics did not choose to entrust their travel plans to magic carpets instead of Boeings.(5)

Sokal made similar remarks regarding the social belief in gravity, and such biting comments have done little to reduce animosity between the two camps. The problem, however, is that they were referring to different things. Dawkins was referring to the truth of the content of belief in the moon as a calabash, while the unnamed sociologist was referring to the rationality of believing something considered by others to be unscientific.

It is important to keep in mind that, without the existence of evidence to the contrary, the tribe was entirely justified in their belief, even if the scientific view was much more accurate. The content of belief need not be true in order to be rational, because people are fallible in what they can know and, if ultimate truth can never be

5. Ulica Segerstråle. 2000. *Defenders of the Truth*. Oxford: Oxford University Press, p. 337.

proven, then we would have to conclude that rationality would also never be possible.

Although it is perfectly reasonable to argue that perfect rationality is not possible, to claim that no rationality exists is untenable; it is difficult to conceive of such a world.(6)

Likewise, without the ability to make detailed observations of the moon and explain the cosmology of its existence, any tribe's claim that the moon existed a quarter million miles away would likely be nonsensical, even if true.

Framework versus Goal-Oriented Truth

The problem lies not simply in conflating categories of truth, but in what expectations one has for truth as a goal or a framework for understanding. The logical positivists claim that truth is a goal, even while admitting that models are an approximation of reality.(7) Likewise, those in the constructivist school who criticise logical positivism often do so on the basis that truth cannot be proven, and therefore conclude that truth does not exist or is a relative concept. Science, on the basis of this argument, is a political process because if truth cannot be proven, then knowledge and truth must be decided upon some other basis. This was the central point of Kuhn's argument, that social factors and influences from outside the scientific process were determining the outcome of what was considered 'true' in science.(8)

6. For a discussion of the problems of 'perfect' rationality, see Herbert Simon. 1976. *Administrative Behavior*. New York: Free Press.

7. Such admissions seemed to become more common as the twentieth century progressed.

8. Thomas Kuhn. 1996. *The Structure of Scientific Revolutions*. Chicago: University of
(continued...)

Kuhn was partly correct. It became apparent that the internal logic of scientific methodology could not account for all decisions, and that simple reference to evidence or experiment leads to endless regression.⁽⁹⁾ It is rather more controversial, though, to make the logical progression from believing in the non-justifiability of scientific theories to believing that science therefore has no objective content. This is a valid argument only if the assumption is made that the goal of science is the proof of truth, for then one can argue that science has failed to meet the standards it has set for itself.

Contrary to this belief, I would argue that this assumption is a 'straw-man', an over-simplification of scientific philosophy to which both logical positivists and constructivists have fallen prey. To make the attainment of truth the criterion upon which one judges science is to set an unrealistic goal, and conveniently avoids difficult issues regarding judgements of validity and objectivity. It is all too easy to become caught in discussions of truth and foundations of knowledge while losing sight of the questions at hand. One must ask why truth is a desirable end goal, and why such effort is spent upon discussing the matter. Another way to consider the matter is to regard truth in science as a regulative ideal, not an end.

A crucial distinction exists between these two conceptions of truth in science. Truth as an end goal maintains that either science can attain truth or it cannot. If it can attain truth, then logical positivism is vindicated, otherwise the constructivists must be

8.(...continued)
Chicago Press.

9. These are hardly new arguments, at any rate. See Lewis Carroll. 1895. "What the Tortoise said to Achilles." *Mind*. 4, pp. 278-280.

right and science is social/political. To attain truth in science, one must be able to justify theories on the basis of evidence and methodology alone, and it has been widely shown since the 1950s that this is not a defensible position. Even the logical positivists have admitted as much, leading Carnap to consider Kuhn to be his 'official' successor.⁽¹⁰⁾ The resolution to the issue seems rather simple at first glance, but unfortunately its solution is not that easy. The matter looks entirely different when a separate question is asked: what if truth acts as a regulator to critical analysis? What if one admits that theories cannot be justified or proven true, that solid foundations for knowledge do not exist, yet argues that science still has something to do with truth and reality?

The definition of science used in this research relies upon just such an argument, and draws inspiration from the American school of pragmatism, in addition to theorists and philosophers such as Karl Popper, Mark Notturmo, Alan Chalmers, and Kristin Shrader-Frechette. This definition is in some ways a hybrid of ideas used by these writers, developed so that its use in public administration can be more easily understood. Its premise is that the role of science is to act as a critical methodology, one which does not rely upon foundations for knowledge or the belief that theories can be justified beyond doubt. Truth as a regulative ideal means that actions and decisions are made within the goal of truth, which is a simple way of saying that scientists can try to discover truth, and accept or reject a theory based upon their judgement of whether or not it is true. This is *not* the same as using some criterion for deciding truth. Notturmo cites the example of using regulative ideals in business, where the aim of maximizing profits structures

10. Notturmo. 2000, *op.cit.*, pp. 226.

decisions and action even though a great deal of uncertainty is involved. As he describes,

. . . we can aim at maximizing profits , and we can base our decisions on that goal, without ever being able to determine whether or when our profits have been maximized. Even if it were possible to determine that one strategy for maximizing profits is better than another . . . *that* would still not suffice to determine whether it was the *best* strategy for maximizing profits, and, hence, whether profits had in fact been maximized. Capitalists, in the face of a possibly infinite number of such strategies, are committed to risk, and to bold guesses concerning which policy will prove most successful. But their commitment to the maximization of profits is meaningful and has real and important consequences.(11)

The impact of regulative ideals is important not only in understanding science, but also how it is used once it enters the realm of public administration. That matter will be addressed in the next chapter.

Concurrent with this regulative ideal of truth, one who practices science must also understand that all knowledge is conditional, and that the task of inquiry is not necessarily to prove or justify theories. Popper took such an idea to the opposite extreme, claiming that science can only exist when something can be disproven, but the important point is that one should not begin inquiry with a firmly-set idea of what the outcome will be.(12) This is the essence of the pragmatists' philosophy, first and most eloquently espoused by Charles Peirce. Peirce was concerned with the state of philosophy in the late 1800s, when theology dominated the discipline. As a trained mathematician and physicist, Peirce was

11. *Ibid.*, p. 243.

12. On this point, I agree with Lakatos's analysis of Popper, that issues of the growth of knowledge are more important than questions of falsifiability. See Imre Lakatos. 1978. *The Methodology of Scientific Research Programmes*. Cambridge: Cambridge University Press.

uncomfortable with the dogmatic nature of inquiry which he witnessed (most of it theological), which never put the existence of God into question. He concluded that inquiry, in order that it be scientific, must not use self-serving arguments which predetermine the outcome. It was therefore possible (and he argued, necessary) to distinguish between science and pseudo-science, by being able to identify when inquiry was not being carried out properly.

It is hoped that this process of distinguishing between science and pseudo-science can best be demonstrated in juxtaposition to several pitfalls in the use of the term and practice of science. Several of these were recognized by Francis Bacon as early as 1600, and certainly none of them are new concepts. Among these hazards are false reasoning, scientism and naturalistic fallacies. Each of these concerns will be addressed in terms of how science and the knowledge it produces may be affected, as well as how public expectations of science influence these shortcomings. Following this, the role of values and value judgements in science will also be covered in more detail, and how this relationship often obscures the distinction between science and rationality. The notion of honest inquiry is but a starting point, for it represents the divergence of values inherent between scientific inquiry and the aims of bureaucratic politics.

False Reasoning

The Lure of False Reasoning

The first of these scientific dangers, false reasoning, was well recognized by Peirce around 1900, who was frustrated by theologians' blindness to possible alternatives

and refusal to consider fundamental questions of their work. It can be divided into two closely related concepts, fake reasoning and sham reasoning. Fake reasoning is to lay claim to knowledge without any commitment as to the truth of the claim, for alternative considerations of wealth, power, or academic advancement may be the primary motivators. Such researchers may lay out the trappings of a reasoned and researched argument, but essentially the final answer does not concern them one way or another, except insofar as it concerns possible rewards. Rather than remaining isolated incidents, such research may be widespread in fields where little peer review is available or empirical verification of results is difficult. It may also affect well-established researchers, who may wish to shy away from unfavourable conclusions, or might be tempted by the possible rewards to go through the 'motions' of conducting research.(13)

The Problem of Sham Reasoning

Sham reasoning occurs when the truth or answer to a question is laid out in advance, in support of a particular goal or agenda which is not questioned further. Distinct from fake reasoning, which is typified by an indifference to the answer, sham reasoning has an obvious stake in a particular conclusion. As Susan Haack aptly describes it,

Sham and fake inquirers aim, not to find the truth, but to make a case for some proposition identified in advance of inquiry. So they are motivated to avoid

13. James E. Alcock. 1996. "Conduct and Misconduct in Science", in: *The Flight from Science and Reason*. Gross, Levitt, Lewis (eds.), New York: New York Academy of Sciences, pp. 31-38.

careful examination of any evidence that might impugn the proposition for which they are seeking to make a case, to play down or obfuscate the importance or relevance of such evidence, to contort themselves explaining it away.(14)

This is a point made in reference to the existence of beliefs and how people justify them.

Peirce viewed the willingness to abandon previously held convictions as essential to the essence of scientific inquiry. It is only modest that we should do so, he argued, for only in dogmatic fixation upon ideas can we assert that they exist with certainty and beyond doubt. Experience and data will not provide this measure of “absolute certainty, exactitude, necessity, or universality.”(15)

No assumption can be made that those who engage in scientific research are more honest or morally sound than others, even though such arguments have been made in the past.(16) They are just as susceptible to false reasoning than anyone else, and as Carl Sagan noted in reference to this topic,

A few saintly personalities stand out amidst a roiling sea of jealousies, ambition, back-biting, suppression of dissent, and absurd conceits. In some fields, highly productive fields, such behavior is almost the norm.(17)

14. Susan Haack. 1996a. “Concern for Truth: What It Means, Why It Matters”, in: *The Flight from Science and Reason*. Gross, Levitt, Lewis (eds.), New York: New York Academy of Sciences, p. 58.

15. Charles S. Peirce. 1957. *Charles S. Peirce: Essays in the Philosophy of Science*. Tomas (ed.), New York: Liberal Arts Press, p. 201.

16. Helga Nowonty. 1985. “Does it Only Need Good Men to do Good Science?” in : *Science as a Commodity*. Gibbons and Wittrock (eds.), Harlow: Longman, pp. 143-155.

17. Carl Sagan. 1996. *The Demon-Haunted World: Science as a Candle in the Dark*.

(continued...)

This has long been a concern of scientists such as Popper and Kuhn, both of whom were worried about the institutionalized nature of research and the existence of 'normal science'. Normal science was the condition described by Kuhn where a scientific paradigm would be adopted to the detriment of all possible alternatives. Scientists would work within the paradigm without question, and would often suppress work which did not agree with its basic assumptions or conclusions.(18)

Peirce's and Popper's criticism was meant for those who mimic scientific inquiry without taking heed of the possible outcomes of such research. To require a certain outcome, to be concerned entirely with what Peirce termed 'conduct', is to lose the very definition of science.

Men, then, continue to tell themselves they regulate their conduct by reason; but they learn to look forward and see what conclusions a given method will lead to before they give their adhesion to it. In short, it is no longer the reasoning which determines what the conclusion shall be, but it is the conclusion which determines what the reasoning shall be.(19)

Again, people believe they are rational, and believe that what they do is justified. They infer from this that the beliefs, themselves, are justified, as well, although this conflates

17.(...continued)

London: Headline Publishers, p. 243.

18. Karl Popper. 1970. "Normal Science and Its Dangers", in : *Criticism and the Growth of Knowledge*. Lakatos and Musgrave (eds.), Cambridge: Cambridge University Press, pp. 52-56.

19. *Ibid.*, p. 202.

justification for adhering to a belief with justification of the statement of belief.

The constructivists contribute to this confusion of political and scientific goals, by believing that one should control the other. Positivists claim that science can provide value-free, objective rationality to politics, so therefore any policies based on science are scientifically rational. The constructivists recognize that values have an important role to play in the process, but assume that it is politics controlling the science. However, to assume that science can be 'harnessed', is to assume that the answers science gives will only favour politically acceptable goals. This is a pessimistic and self-serving argument. In laying the criticism that political agendas determine science, the argument then goes on to say that therefore politics should control science in such a manner. Even if political goals are settled in advance of inquiry, the conclusions on consequences of those goals should not be. Indeed, the main criterion used by Peirce, Chalmers, and Lakatos in measuring the worth of science, is its ability to tell us something we did not know previously.⁽²⁰⁾ Should the goal of science be to support something we claim to know already, the value of science as knowledge *production* is reduced considerably. Rather than claim that we know in advance of inquiry what its outcome will be, science should instead be used to discover that which is not known.

The Necessity of Doubt

This relates to Peirce's discussion of the role of doubt and belief in inquiry.

20. Alan Chalmers, 1990. *Science and Its Fabrication*. Minneapolis: University of Minnesota Press; Lakatos. 1978, *op. cit.*; *Ibid*.

Although many ways of fixing belief exist, he wrote, the tendency to hold fast to already held certainties and convictions does not further the role of science. On the contrary, the existence of doubt acts not only as a motivator of scientific research, but also as a hallmark of its more genuine nature. For where doubt ceases to exist, inquiry ends. If one therefore undertakes inquiry with a firm refusal to abandon beliefs, then the science itself is but a show and “mainly decorative, or at most, as a secondary aid in minor matters.”(21) To remain true to scientific research, one must not persist in fixating upon certain assumptions.

In order that science may be successful, its votaries must hasten to surrender themselves at discretion to experimental inquiry, in advance of knowing what its decisions may be. There must be no reservations.(22)

That reservations do exist is not surprising, even among those with the best of intentions in pursuing a balanced decision. Not only is it difficult to abandon beliefs or objectives in light of new evidence, but suspicion often exists as to the validity of the evidence, itself. That government’s attempt to shut people out from the process of decision-making, and to not allow independent scientists to review the findings, themselves, cannot lend much confidence to the ability of political systems to approach questions truthfully. The goals of scientists and those of the administrative state are not necessarily the same, nor are their methods.

For example, a cost-benefit analysis of a dam cannot be scientific if its conclusion

21. Peirce. 1957, *op. cit.*, p. 202.

22. *Ibid.*, p. 202.

was made in advance, so that the analysis only serves to legitimate policy *regardless of the evidence*. That is, if researchers changed the analysis in order to conclude that a particular outcome was desirable (i.e., building the dam), then by definition the research was not scientific. Thus it is not a matter of determining something to be rational, for a study can be rational without being scientific. In essence, the goals of government information control may clash directly with those of scientific inquiry, at least in its idealised form. The central administrative state as it has existed since Hobbes' time, has generally attempted to retain control of both the form and content of political debates. Based upon a stewardship ethic of instrumental rationality, governments are generally not interested in information or knowledge that they cannot control. Decision-makers should reach conclusions in advance, the belief goes, for uncertainty can only breed paralysis in political action. The political need for certainty requires predictions to be accurate and unconditional; information is needed in advance of action.

Scientific inquiry, by contrast, should not lay claim to knowing all answers ahead of time. Researchers should at least be willing to change conclusions in light of new evidence, to evaluate evidence on both sides of the argument, and to reach conclusions even if such findings are unpopular, politically unacceptable, or undermine previously held beliefs. This is certainly an ideal, and one which individuals or institutions may never truly achieve. Nevertheless, it does at least provide a measure for evaluating whether a research program maybe considered truly scientific, rather than simply going through the motions of inquiry. Francis Bacon warned of such a trap when he wrote of 'rational idols.' For him, rational idols were doctrines that were apparently verified by

observation, but were actually preconceived notions to which evidence was then distorted to fit. Aristotle was supposedly guilty of such errors, when his dialectics assumed preconceived categories and then explained all else in order to fit them.(23)

However much we may assume that science has advanced, present day examples of sham reasoning are not difficult to find. The example given in Chapter 1, of the non-use of science in the desertification debates in Namibia, provides a telling illustration. Basing analyses on steady-state or 'equilibrium' models of ecosystems, development planning has acted with the assumption/conclusion that desertification is reality. On the contrary,

Despite the confidence with which assertions of degradation are made in Namibia, few, if any, have been tested with, or are supported by, empirical data. Studies to date have produced ambiguous results, which nonetheless have been interpreted as due to degradation processes. This tendency to perceive observed patterns with reference to a desertification paradigm not only leads to a self-fulfilling degradation prophecy but also overlooks alternative explanations for ecological phenomena that may be more parsimonious.(24)

The conflict between science and administrative politics is similarly quite prevalent. As modern politics concerns itself with control of information and the need for predetermining outcomes of policies or information, so the need of science to accept possibly unpalatable conclusions produces discord.

23. Francis Bacon. 1994 [1620]. *Novum Organum*. Urbach and Gibson (eds.), Chicago: Open Court Publishing, pp. 68-70.

24. Sian Sullivan. 1999. "The impacts of people and livestock on topographically diverse open wood- and shrub-lands in arid north-west Namibia." *Global Ecology and Biogeography*. 8, pp. 257-258.

Many examples of this friction have surfaced in the US and Canada. Rather than supporting the goals of government, even assuming that such goals were explicit, scientific research often unearthed evidence that directly contradicted what the state wanted to be known. In reaction to new and potentially damaging knowledge, administrative agencies have made strong, sometimes violent, attempts to suppress such information. States have coerced individual scientists into silence, removed them from research positions, and had their data destroyed in efforts to keep dissent at a minimum. One of the primary responsibilities of organizations such as PEER is to safeguard such research from government control and censorship.(25)

It is not surprising that governments should attempt to suppress the findings of science. If the results of scientific inquiry were known in advance, then it would cease to be science. At any rate, there will be little reason to enter into inquiry if we do not allow the outcome to be questioned, if we pretend that we already know the answer. The very ability of science to produce unpredictable outcomes is what makes it both valuable as knowledge, and dangerous to dominant interests. Dominant interests, after all, rest their legitimacy upon beliefs which are not meant to be questioned, but the nagging doubt that leads to inquiry and scientific research is a threat to this desire to hold tenacious convictions. Even more threatening, perhaps, is the evidence produced by science. Even if science cannot prove something beyond doubt, such research can often illustrate how

25. Jeffrey A. Hutchings, et. al. 1997. "Is scientific inquiry compatible with government information control?" *Canadian Journal of Fisheries and Aquatic Sciences*. 54, pp. 1198-1210; Todd Wilkinson. 1998. *Science Under Siege: The Politicians' War on Nature and Truth*. Boulder: Johnson Books.

long held beliefs (e.g., the biological inferiority of women or non-whites) rest upon supposition rather than empirical evidence.(26)

Although its conclusions may be unfavourable, the aura of legitimacy surrounding science is reason enough for the state to want to coopt and appropriate it. This is not simply a conspiratorial view, for this desire to use science to collective ends is widely supported by the public. Despite discussions on post-modern or post-material societies, public faith in science tends to remain higher than faith in politicians, and the public understanding of science maintains that its methodologies can be fruitfully applied to all manner of social enterprises. This leads into the second and third pitfalls associated with science, that of scientism and the naturalistic fallacy. Although these two concepts could both be referred to as 'technicism,' sufficient differences exist to warrant separate consideration.

The Problem of Scientism

How Applicable is Science?

Scientism is the belief that science is the highest form of knowledge, and can be as usefully applied to societies as it is to physics and other established sciences. By importing what appear to be scientific methodologies into areas such as politics and economics, many believe that such areas will therefore have the same rigour and certainty

26. Of course, this does not prevent scientists from actively supporting such ideas, and attempting to prove them scientifically. The collaboration of scientists in Germany and elsewhere in trying to prove genetic inferiority of other races was particularly disturbing. Such efforts ultimately failed, however, because of the very evidence they were trying to produce. See Tom Sorell. 1991. *Scientism: Philosophy and the Infatuation with Science*. London: Routledge.

that the hard sciences enjoy. Using scientific methods in politics is not the same as using them in physics. The danger is that in not recognising the uncertainty inherent in the area of study, one will paper over such uncertainties with nonscientific or pseudoscientific beliefs. Furthermore, those relying upon the information will be less likely to critically evaluate what has been said, similarly believing that uncertainties should not exist. It is in this way that otherwise scientific studies have become entirely political, and how others have failed to see the presence of political influence.

As Thomas Hobbes wrote, when the knowledge of science in politics is uncertain, people will tend to rely upon their preconceived pseudo-theories and convictions, interjecting them into whatever areas the data do not cover. Better that people rely upon their common sense than false science, because at least common sense is intuitive and can be explained to others.(27) Science is by nature counter-intuitive, it tells us things that do not make sense purely by observation. That the earth moves around the sun is now seen as fact, but from our everyday perspectives there is nothing commonsensical about such a notion. Likewise, pseudoscience may tell us to do things that do not make sense in and of themselves, but are likely not grounded on any empirical evidence, either.

Blind faith in science and its methods is dangerous, because it allows for just such pseudoscience to be used undetected. With its promises of certainty and infallible knowledge, it also inspires a form of political and economic control. Wrongly believing that scientific knowledge can be controlled, and mistakenly presuming that this knowledge is infallible, scientism can encourage ideals of social engineering. That is,

27. Thomas Hobbes. 1985 [1651]. *Leviathan*. London: Penguin Books, p. 116.

social engineering carries the belief that societies and economies can be controlled from a central, hierarchical order. In many ways social engineering may seem compatible with base philosophies of the administrative state, but even Hobbes warned of such a development. To rely too much upon science without knowledge of its precepts, is to become dependent upon experts and their authority.

Want of Science, that is, Ignorance of causes, disposeth, or rather constraineth a man to rely on the advise, and authority of others. For all men whom the truth concernes, if they rely not on their own, must rely upon the opinion of some other, whom they think wiser than themselves, and see not why he should deceive them.(28)

The assumption, of course, is that it is possible to know all relevant information concerning social issues.

Scientism and Academic Literature

Scientism is a phenomenon often overlooked in the relevant literature, and perhaps for obvious reasons. The logical positivists believe that science is the highest form of knowledge, and that its use in areas other than research into the nature of the physical universe is entirely appropriate. They view scientific rationality as superior to political rationality, and hence feel that political decisions should be subordinated to science. The only problem they may foresee in making such an application is the level of uncertainty surrounding a study. If uncertainty regarding an answer disappears, so too does uncertainty regarding future actions. These ideas are pervasive, for any obstacles in

28. *Ibid*, pp. 164-165.

environmentally-related policies are often met with the promise that solutions can be found 'if only' more research on the problem is carried out. Focussing so closely upon the answers to research, however, often obscures the ever more important issue of what question was being asked.

The reasons for constructivists omitting such issues of scientism are more difficult to answer. It would seem reasonable to assume that those who criticise the application of science would focus upon scientism and its influence throughout history, yet writers such as Kuhn are strangely ambivalent regarding such issues. What Kuhn seemed to argue, and what most distressed his critics (such as Popper and Feyerabend), was that Kuhn's concept of normal science was not only explanatory, but in many ways normative, as well.(29) Although Popper and others admitted the existence of 'normal science' and interpreted it as negative, Kuhn never offered any alternatives nor suggestions for how things should be done differently. It may have been that not only did Kuhn see the existence of political control of science by elites and suppression of any criticism, but he may have implicitly endorsed such ideas through his writings.(30)

That Kuhn may have held such beliefs is perhaps not entirely surprising, since his advisor and leading influence was James Conant, one of the heads of the Manhattan Project and a leading Cold War 'hawk'. Conant felt that Kuhn's ideas perfectly

29. See Paul Feyerabend. 1970. "Consolations for the Specialist", in : *Criticism and the Growth of Knowledge*. Lakatos and Musgrave (eds.), Cambridge: Cambridge University Press, pp. 197-230.

30. See Steve Fuller. 2000. *Thomas Kuhn : A Philosophical History for Our Times*. Chicago: University of Chicago Press.

legitimated the US's need for military control of science and suppression of debate. Cold War hawks in the US believed they needed science for military applications, and could not afford the same debates of conscience which erupted toward the end of the Manhattan Project. A philosophy which saw suppression of criticism and political control of scientific content as normal served the military well in the post-Sputnik years. These ideas have lingered, however, even among those who feel that political control of science is 'emancipatory', rather than having their origins in Cold War politics. For example, Sandra Harding calls for science to be used only for "politically acceptable goals," and her call is certainly not alone.⁽³¹⁾ But acceptable to whom? To make science "acceptable" assumes that not only is science directly applicable and proper for social issues, but that it's outcome can and should be controlled by politics.

One of the major problems is that writers have too often focussed upon the answers which science gives. Is the information true, is it accurate, is it uncertain and what can be done to alleviate these problems? But in discussions of rationality and politics, answers are ever only half of the problem, and generally they are not even the more important half. Discussions of how useful science is to answering social questions avoid the equally important matter of how political questions are being framed. After all, if one asks the wrong question, then no answer will ever be appropriate to the issue. In making policy judgements, policy-makers often establish rationales based upon what is known as a 'naturalistic fallacy,' or its attendant concept of the 'fallacy of unfinished

31. See Sandra Harding. 1986. *The Science Question in Feminism*. Ithaca: Cornell University Press.

business.’ If those in politics define everything in terms of technical problems, these fallacies leave little room for any approach which does not reduce matters to technical considerations. These concepts are what give license to scientism, and help to explain why the role of science in policy is so often misunderstood and reviled by critics.

Naturalistic Fallacies and ‘Unfinished Business’

Institutionalizing Scientism

As Kristin Shrader-Frechette writes, the naturalistic fallacy is the tendency to explain away ethical issues by reference to science alone. Related to faith in scientism, this fallacy posits that science is all that is needed to settle ethical disputes and moral claims, because technical considerations of problems are the only way to perceive the issue. So, for example, disputes over whether or not a nuclear power plant should be built could be settled purely by reference to a low probability of risk to those living in the area.⁽³²⁾ Likewise, dams could be built and justified by reference to a positive cost-benefit analysis. In both cases, the properties of the analysis, alone, are considered sufficient criteria for settlement of ethical disputes. As a result, however, “considerations such as distributive equity, rights, and duties” are absent from deliberation.⁽³³⁾

The fallacy of unfinished business is a closely related concept. Building upon the

32. Shrader-Frechette. 1985, *op. cit.*, pp. 109-111. See also Kristin Shrader-Frechette. 1993. *Burying Uncertainty*. Berkeley: University of California Press.

33. Shrader-Frechette. 1985, *op.cit.*, p. 110.

belief (usually implicit) that empirical, statistical, or technical considerations are sufficient to settle complex ethical or moral issues, this fallacy then goes on to define all such issues purely in terms of such considerations.(34) This fallacy goes by other names when referred to by different authors, such as the 'instrumental environmentalism' of Dryzek.(35) Shrader-Frechette's explanation seems to be the most fully developed in terms of considering such issues in light of both the science involved, as well as the philosophies underlying the ethics. Essentially, the fallacy of unfinished business is so named because it assumes that environmental problems are the result of technical flaws, and so can be mitigated by the very system that helped to create them.

...this assumption is that technological and environmental problems have only technical but not social, ethical, or political solutions. Proponents of this assumption believe that all that is necessary to solve our technological and environmental problems is more 'business as usual', more and better technology.(36)

The nature of these fallacies is improper for science, and scientific research (as defined here) cannot be properly maintained under such conditions. As such beliefs place science in an exalted position, such a statement may seem disingenuous. Yet as with scientism, naturalistic fallacies place scientific research in a position for which it is both ill-suited and vulnerable to abuse. To make pronouncements upon ethical issues purely by

34. *Ibid.*

35. See John Dryzek. 1990. "Designs for Environmental Discourse: the Greening of the Administrative State?" in: *Managing Leviathan*. Paehlke and Torgerson (eds.) Peterborough, ONT: Broadview Press, pp. 97-111.

36. Shrader-Frechette. 1985, *op.cit.*, pp.106-107.

reference to scientific evidence or research, is merely a way of masking value-laden goals behind something assumed to be value-neutral. Although this may not be a consciously intentional act, it is essentially dishonest. But those who use this scientific information can seemingly transform value-neutral research into solid political arguments.

This apparent transformation is quite easy to achieve. Say, for example, that research was carried out regarding the risks of a dam suffering a major accident in a particular region. The research concludes that the probability of a serious accident is one event per million years, close to the threshold of what is commonly referred to by scientists as ‘unquantifiable,’ or by politicians as ‘negligible.’ Those with authority to make a final decision on construction then refer to this study as evidence that the scheme is ‘justified by science.’(37) But was it? The study only answered what was asked, which was to determine the probable occurrence of a major accident. Yet no reference was made to minor accidents, what constitutes a ‘major’ accident, whether some alternative form of power production would have been better, or whether more electrical production was even necessary. By framing the study in a different manner, the interpretation of it changed dramatically. Rather than remarking on the most likely result of a specific condition posed to it, the study resembles a political pronouncement.

This is a rather basic example, and in practice the role of naturalistic fallacies become even more troublesome. Policy-makers often seem to know how to ask questions

37. A succinct critique of this use of scientific reasoning can be found in Lynn Maguire.1994. “Science, Values, and Uncertainty: A Critique of the Wildlands Project”, in: *Environmental Policy and Biodiversity*. Grumbine (ed.), Washington, DC: Island Press pp. 267-272.

so that the answers justify their positions, all without reference to what assumptions and goals lay behind the study as presented. The process then becomes a form of false reasoning, because the evidence sought is highly selective and end goals are not put into question. Rather, science is 'controlled' so that only acceptable answers are produced. If the problem is only presented in particular ways, and the science questions asked are quite narrow, then government (or industry) can control the terms of debate.(38)

It is a truism that the wise person is not necessarily known by the answers he gives, but by the way he formulates the questions. Perhaps this is because even the best of us often cannot resolve a problem when it has been formulated in terms of the wrong questions.(39)

These issues are most prevalent in cost-benefit analysis, risk analysis and environmental impact assessments. Policy tools such as these are powerful and generally enjoy the confidence of those who use them in making decisions, who often do not question the assumptions hidden within the analyses. Not only are the answers assumed to be 'true' without question, but the very questions which lead to the answer are considered appropriate to the problem. Rather than relying upon direct data manipulation, this is a form of contextual control (or censorship) of scientific research.

Yet even if the larger social issues were considered, science would not necessarily be of much guidance in determining the best course of action, not without clearly defined goals and criteria for choice. Social problems cannot be so easily defined, and attempts to

38. See Sharon Beder. 1997. *Global Spin: the Corporate Assault on Environmentalism*. White River Junction, VT: Chelsea Green Publishing.

39. Shrader-Frechette. 1985, *op.cit.*, p. 106.

follow scientific models suffer great difficulties. Such concerns cannot be reduced to physical or technical problems waiting to be solved. Yet the problem of scientism and the naturalistic fallacy continue, as people attempt to apply engineering techniques to the worlds of politics and economics, certain in their ability to provide the one true solution. But as ethics and morals cannot be divorced from politics, so this technical conception of environmental problems finds itself lacking. In general, two problems exist as a result of such constructions. Ethical and moral issues are swept aside in lieu of 'scientific' explanations, leaving debates reduced to purely technical matters. In consequence, policies are subsequently transformed into means-ends calculations of associated criteria, rather than as part of a wider political debate concerning the need and desirability of the questions asked. Much of this has to do with the conception of rationality in politics, and the confusion between science and rationality.

Although the preceding explanations of scientific 'pitfalls' may help to provide a greater conceptual definition of science in this research, it may still seem to put such a definition of science into an idealised state. One may assume that research remains scientific only if it avoids all such traps, and that what remains is a highly rational, value-free, and universally objective description of the world. But to leave it at this would be entirely misleading, for discussion of possible errors in science only points out what may be avoidable, not what will make science perfect. The idealisation of a perfect and value-free science comes close to the notion of scientism, because it places impossible demands upon what is essentially a fallible, human endeavour. By taking care to reduce biases as much as possible, mistakes of fake reasoning and technicism may be reduced.

In the end, however, science cannot be divorced from values, nor should it be. Ethical considerations of the values embedded in research should be considered, and doing so will place political debates back upon a more suitable footing than if a strict fact-value dichotomy persists. This is possible simply by virtue of making the issues more visible and thus debatable, rather than falling into the trap of discussing all social problems on the level of technical considerations. Even if facts and values are inseparable, their proper respective places can at least be discussed. Ultimately, such a discussion must turn from the possible ways in which science is done poorly, to how science and rationality are related, and why such concepts are so easily confused in environmental policy.

Values, Rationality and Objectivity in Science

The Values of Environmental Sciences

Early twentieth century positivists maintained that the natural and physical sciences represented a nearly infallible method of research and inquiry. Writers such as Ernst Mach argued that science was a direct representation of reality, and that it could describe this empirical reality without distortion, omission, or error. Although this school of strong positivism was in a distinct minority even then, various shades of such beliefs have remained. In many ways, it is perhaps in the interests of scientists to argue for such a position, even if they do not personally believe it, for its acceptance among those who use science certainly makes their knowledge more valuable. Were they to admit that their

research is uncertain, subjective, and highly contingent, it is highly likely that further funding would not be forthcoming. True enough, when scientists have made just such admissions in the past, they have often been met with voices of frustration from people or institutions in need of unqualified evidence.(40)

Such frustration is generally indicative of a public belief that science is neutral and value-free. The public appearance in debate of opposing sides in scientific debates may seem confusing to many, whose conception of science is based upon a firm belief that truth is the final outcome. Many people have difficulty in understanding how mutually contradictory conclusions can both be true. If they cannot both be true, perhaps one or the other has been politically motivated or manipulated. Or perhaps neither is true, because truth does not exist, and all that we see are political battles over contested realities. Either way, it seems difficult to believe that both scientific conclusions were the honest results or research based upon the same reality (and even, at times, the same data sets). The first possible outcome, where science has been manipulated, is always possible and is the subject of much of the next chapter. It is, however, dangerous to always assume that this explanation is the only one available, and that all scientific research is so controlled. As for the other two explanations, that reality does not exist or that it exists but can be described in very different (even contradictory) ways, the latter is a more reasonable explanation. It is more reasonable for a number of reasons, least of all the severe conclusions which would have to be drawn if there was no reality to be studied, if

40. See examples in Karen Litfin. 1994. *Ozone Discourses*. New York: Columbia University Press.

everything were relative and had no substance.

The explanation favoured here only assumes that scientists are human, and that the enterprise in which they are engaged requires the use of value judgements to a larger extent than is normally acknowledged. It is the presence of these value judgements which help to explain why the same subject can have entirely different conclusions and policy implications. This explanation also does not rule out the possibility of political/social influences, but rather attempts to integrate their existence into broader considerations of research methodologies and attempts by scientists to provide the most parsimonious explanation. This form of 'weak constructivism,' as Alan Chalmers describes it, admits that scientists must work within institutions of thought and action that influence how descriptions are made, but which does not admit that scientists can describe this world in any way they wish.(41)

The values imbedded within scientific work are of three types described by Helen Longino, and described with specific reference to ecological science by Shrader-Frechette and McCoy.(42) These include: bias values, contextual values, and constitutive or methodological values. The bias values closely reflect those concerns expressed earlier, in reference to fake and false reasoning in scientific research, for bias values are those cases in which information is deliberately manipulated or withheld, in order to advance specific goals of the researcher. Bias values are perhaps the easiest of values to avoid in scientific

41. Chalmers. 1990, *op. cit.*

42. Helen Longino. 1990. *Science as Social Knowledge*. Princeton: Princeton University Press; Shrader-Frechette and McCoy. 1993, *op. cit.*, pp. 80-105.

research, although the impetus for falsifying data may well be higher in certain institutions than in others. Such biases are generally more visible (even if only in retrospect) than other values, and this is a topic which will be elaborated upon more fully in later chapters.

The second set of values in science are contextual values. These represent the influence of social, cultural, ethical or philosophical values in research, and appear whenever judgements regarding scope or method of research are made in reference to such beliefs. An ideal form of science might possibly operate outside of such influences, but the reality of science is that it must be performed within some context. The original school of the sociology of science (the so-called 'Mertonian school') focussed greatly upon such influences, showing how cultural and social values influence what gets studied and when.⁽⁴³⁾ The importance of money and funding in scientific research makes such influences nearly impossible to avoid, for grant proposals and the direction of even individual research are greatly conditioned by what funding agencies deem most appropriate.⁽⁴⁴⁾ Personal experiences and cultural backgrounds likewise act as signposts for determining appropriate research strategies.

One reason why contextual values, like obtaining funding, have played such a large role in many areas of scientific research is that any research is hampered by some type of incomplete information. Scientists use contextual values to fill the gaps in their knowledge and to help determine scientific procedures and

43. See R. K. Merton. 1970. *Science, Technology, and Society in Seventeenth-Century England*. New York: Howard Fertig.

44. Haack. 1996b, *op. cit.*

assumptions.(45)

This is similar to the idea mentioned earlier by Hobbes, that in the absence of detailed knowledge, one fills in the gaps left by scientific knowledge by pseudo-scientific belief. And because scientific knowledge can never provide knowledge beyond any measure of certainty and beyond all doubt, such influences will always remain.

Yet the existence of such influences does not mean that scientific research influenced thus is not objective, or that it does not serve its proper role under such conditions. On the contrary, contextual values are highly important in motivating much of what becomes research, for scientists are rarely absorbed in abstract notions of truth in the absence of any other interests. What motivates them may well be obsession with some particular question, the context of which is highly important to them because of its connection to their background and personal beliefs. A number of biographical works on scientists have strongly hinted in this direction, that the nature of their research was highly influenced by experiences and beliefs formed earlier in their lives. That the biologist Edward Wilson became interested in studying issues of evolution and natural history should hardly be a surprise, he wrote, considering the formative experiences of his childhood and schooling in relation to these topics.(46)

Furthermore, it should not be assumed that the presence of such influences unnecessarily biases scientific work. It is fairly well known that Newton believed in both

45. Shrader-Frechette and McCoy. 1993, *op. cit.*, p. 84.

46. Edward O. Wilson. 1998. *Consilience*. New York: Little, Brown, and Company.

witches and astrology, yet the existence of such beliefs does not invalidate his crucial work in physics. Arguments have been made in the opposite direction, claiming that social and economic factors alone account for the nature of the models constructed by these scientists, with the conclusion that in order for science to be more 'objective' or 'fair', a broader cross-section of social and political beliefs is needed among the ranks of scientists.(47) This 'strong constructivist' school of science forwards the belief that truth is not something discovered, but is rather reached by consensus of a 'community of knowers', a belief which in the contemporary United States had a great influence over how science is taught in primary and secondary education. Much of this seems to be motivated by a desire to right past wrongs resulting from authoritarian structures and lack of egalitarianism, so that no one feels left out in the process of 'knowing.' It can thus be described as a response to the excesses of technocratic rule, and a desire to return to the fundamentals of democracy. Such an interest in egalitarianism can, in fact, help scientific processes in a broader political context, but the conclusion that science, itself, rests solely on the grounds of consensus does not negate authoritarian political structures.(48)

Similar arguments of strong constructivism have been used by political groups that scientific beliefs were invalid because of their ideological implications, or that the political affiliations of particular scientists invalidated their research. In this way, the Nazi party in Germany attempted to discredit Jewish scientists, as when Einstein's

47. Harding. 1986, *op.cit.*

48. See Aaron Wildalsky. 1995. *But Is It True?* Cambridge, MA: Harvard University Press.

theories of relativity were condemned for their relativistic and 'Jewish' nature.⁽⁴⁹⁾ If scientists were Jewish or had left-wing political affiliations, it was assumed that they could not carry out properly objective scientific research. Such reactions were based upon the assumption that contextual values not only existed, but had such influence so as to determine the very nature of scientific research. Science was not allowed to produce unexpected results, at least not as long as they were not in line with established political doctrines of the regime. In this way, the Nazis inflicted grievous damage upon the quality of scientific research in Germany for decades, with a large exodus of scientists to the United States during the Second World War.

Marxists (in the Soviet Union, in particular) had a similar disdain for many physicists and biologists, Einstein among them. Beginning in the 1920s, debates considered whether past scientific theories were commensurate with dialectical materialism, and in this way scientists could further their careers outside of normal channels. Boris Gessen was one who advanced the theory that Isaac Newton's works in the *Principia* were based upon the influences of capitalism, political liberalism, and doctrines of the English church. In his evaluation, codification of the laws of physics had much less to do with Newton's abilities, than the need of British capitalism for improved metallurgy and military ballistics. The discovery of Newton's laws was a historical

49. Paul R. Josephson. 1996. *Totalitarian Science and Technology*. New Jersey: Humanities Press, pp. 52-53. Ironically, Einstein himself rejected the philosophical implications of physical relativity, and his theories (like those of Werner Heisenberg) do not imply acasuality in physics- only difficulty in measuring casual relationships.

necessity, not a remarkable form of discovery.(50)

Much worse were the effects such ideological analyses had upon scientists living in the Soviet Union, especially in the biological sciences while under the influence of Trofim Lysenko. With many careers (and more than a few lives) ended on the basis of the ideological acceptability of research, Soviet authorities strongly believed that contextual values *alone* could govern the truth of scientific theories.(51) By claiming that Mendelian genetics was neither suitable for dialectical materialism nor 'proletarian science', Lysenko forced the formerly debunked Lamarckian conception of genetics upon the scientific community. This was upheld for many years, even in the face of mounting evidence that such beliefs could never be proven nor put into practice. What is most surprising, under such conditions, is that any preservation of alternative values was possible, values which in their own way allowed for ecological research not deemed appropriate by the state.(52)

These political fights did not only affect contextual values, however, but also the third category, constitutive or methodological values. These values are impossible to avoid in scientific research, for they guide the decisions as to which research methodologies are most appropriate in analysing issues. Any given methodology has a

50. *Ibid.*, pp. 50-54.

51. Loren Graham. 1998. *What Have We Learned About Science and Technology from the Russian Experience?* Stanford: Stanford University Press.

52. Douglas Weiner. 1999. *A Little Corner of Freedom*. Berkeley: University of California Press. Weiner's is one of the most interesting histories of this area, and is an indication of the resilience (also found in Graham's histories) of science under difficult conditions.

number of assumptions built into its structure, presuppositions regarding the epistemological validity of the method and the ontological nature of the world. The methodological individualism of microeconomics has a constitutive value, as it makes assumptions of individual free will, perfect information, and perfect rationality.(53) Such assumptions are fairly obvious, however, which is not always the case with methodological issues. Decisions of which data to record and which to exclude are based upon values which indicate that not all data sets are relevant. Records are made of only those events which the model indicates are important or can be measured efficiently, and the ability to judge which is which can only be based upon presuppositions which are only neutral in relation to the assumptions from which one begins. Even when researchers use computer programs to collate data, they are often not aware of the assumptions built into the programs.(54)

Do Values Threaten Objectivity?

These values are critical because they can often determine the outcome of the research, as opposed to conclusions reached by following alternative methodologies available. In those areas of the sciences where theories can be confirmed within a great degree of accuracy, the discrepancy between alternative views may not be great. In those areas, however, where it is quite difficult to obtain hard evidence regarding the accuracy

53. Shrader-Frechette. 1985, *op. cit.*, pp. 69-71.

54. They may also simply be resigned to such assumptions, even if unhappy with them. This would be a consequence of 'normal science' as Kuhn described it.

of one theory over another, the differences between alternative accounts can be substantial. For the most part, the ecological sciences fall into the latter category, for explanations of ecosystem modelling and dynamics are incredibly difficult to establish within any great degree of accuracy. The theory of island biogeography, for example, is perhaps the closest ecology has come to a working model of ecosystem interaction, yet the theory is based upon a number of working assumptions which can not be established without some measure of faith.(55)

The existence of uncertainty may lead some to the conclusion that the values imbedded within scientific research harm objectivity and makes its existence all but impossible. However, even when contextual and constitutive values influence the outcome of research projects, other criteria exist to determine the validity of its worth as research. As Shrader-Frechette and McCoy write, “Values threaten objectivity, however, only if they *alone* determine the facts.”(56) Even in the face of persistent belief, evidence can prove that a theory has no basis in fact, and that reliance upon such a model only threatens policies based upon its conclusions. Such ability to disprove theories has been the case with the idea of a balance of nature, the ideal that nature, left to itself without human interference, will attain a balanced state from which it will not move barring the intrusion of some outside influence. This belief, despite its political usefulness in some conservation efforts, has been widely discredited in the scientific literature, as it has been possible to show evidence indicating that ecosystems are dynamic and change over time.

55. Shrader-Frechette and McCoy. 1993, *op. cit.*

56. *Ibid.*, p. 101.

Even without a fully working model of ecosystem interactions, fair measures of objectivity can still be attained.(57)

What these scientific methodologies have in common is not simply a belief that one version is more accurate than another, but a set of constitutive values which define the criteria by which scientific models are assessed. Thomas Kuhn defined these five criteria as: accuracy, scope, fruitfulness, consistency, and simplicity.(58) Thus the choice of one model over another is not subjective, but objective *only* because of the presence of such values in the scientific process. How each of these terms is defined and employed within research is often the most contentious issue, for while definitions of accuracy are fairly well established (in environmental sciences, they usually require 95-99% confidence), the task of defining what is fruitful is far more difficult. In ecology, merely the matter of scope can change the conclusions reached dramatically, as ecosystem boundaries are rarely well established.(59) Theories which disagree with one another with regard to any of these criteria are not unscientific *per se*, but rather, they should be evaluated in terms of the respective questions being asked.

For example, a study may operate under the assumption that a 20,000 hectare

57. Sian Sullivan. 1996. "Towards a non-equilibrium ecology: perspectives from an arid land." *Journal of Biogeography*. 23, pp. 1-5; Daniel Botkin. 1990. *Discordant Harmonies*. New York: Oxford University Press.

58. Thomas Kuhn. 1977. *The Essential Tension*. Chicago: University of Chicago Press, pp. 320-339.

59. Carl F. Jordan and Christopher Miller. 1996. "Scientific Uncertainty as a Constraint to Environmental Problem Solving: Large-Scale Ecosystems", in: *Scientific Uncertainty and Environmental Problem Solving*. Lemons (ed.), London: Blackwell Scientific, p. 109.

region surrounding a proposed dam site is needed to investigate migration patterns of local fauna. This decision would be based upon methodological or constitutive values, because the researchers believed that the most accurate result would be produced by this decision regarding scope of the study. The funding agency, however, may only provide enough support for a study which includes 10,000 hectares. Such limits in support represent a political (contextual) decision influencing the outcome of study, but indirectly and without deliberate regard for the particular outcome which that decisions creates. The local political authority where the reservoir site is located may further restrict the study to avoid areas where new development is taking place, in order to prevent research on how such development affects species loss. Political restriction of research is a much more problematic influence of political (bias) values, because it is made with the express intent of altering a research conclusion in a particular direction. Finally, the conclusions of the ecologists may be suppressed by their university, grant agency or government, or the information may be directly manipulated by the researchers, themselves. These actions would be the most overt use of values influencing science, and automatically negate the value of science in the research.

The presence of values surrounding science, and their role in determining the direction of research in the absence of complete knowledge, does cause problems in terms of how one defines rationality for policy. If the common view is that science helps to increase rationality in decision-making by lending greater neutrality and objectivity to the process, then what do values in science mean for rational decision-making? If full information is not possible, if science embodies certain values in its approaches to

problems, does this mean that rationality is not possible? When issues of a technical nature are evaluated, are not science and rationality much the same thing in determining what is the best policy? The short answer is that they are not the same, and the conflation of the two terms only clouds issues of accountability in government and discussion of the ethical bases of environmental policy.

Rationality and Science

In discussions of scientific and technological issues, the term 'science and rationality' is used rather frequently, and quite possibly without much thought as to the suitability of those two words being joined. By claiming that science and rationality are much the same, a claim made by both proponents and critics of modern society, a number of concepts, visions, and metaphors are joined together. These include images of rationality as existing in a pure state where full information is possible and desirable, where optimal decisions are made once all relevant information is made available, and where science provides the environment in which such conditions can be made to exist. Such notions may be illusory, but more than that, they prime debate on environmental issues in such a way that science, once it becomes introduced to the decision-making process, falls prey to the pitfalls of pseudo-science and scientific mimicry described above. It is for this reason that rationality must also be defined before going on to discussions of bureaucratic politics and science in Chapter 3.

Numerous definitions of rationality exist. Rationality can take a number of different subject forms, such as scientific rationality, social rationality, or economic

rationality, and it may exist on several levels: individual, contextual, systemic, etc. Such definitions give rationality a better basis for debate than most working definitions of science, for the conceptual clarity of these definitions tends to be much greater. One can discuss contradictions of rationality at different levels, and see how, for example, actions can be rational at an individual level but not on a wider social scale. All the same, one cannot dismiss the existence of a wider notion that rationality, at its most basic, is a means-ends evaluation of how well goals are achieved. This implicit notion of goals is the important starting point, for rationality at all levels contains an explicit normative measure which differs from idealized scientific work.

Rationality is part of a process of action. Its values are intimately related to the end result, as part of a decision-making process which values certain outcomes over others.⁽⁶⁰⁾ The use of terms such as 'scientific rationality' or 'economic rationality' merely differentiate which sets of value-criteria are being established for the evaluation. Scientific rationality will value certain information over other forms, while legal rationality values certain methodologies and assumptions which are not used in more ethnically-based rationality. The values involved may be social, religious, methodological, or economic, but all share the condition of being categorical value judgements regarding certain outcomes of action.

As part of this process, similar conditions can give rise to entirely different conclusions. For example, in 1999 the US Department of Interior ruled that native Hopis

60. Herman R. van Gunsteren. 1976. *The Quest for Control*. London: John Wiley & Sons, pp. 6-13.

in the American Southwest could hunt golden eagles and red-tailed hawks in national park areas. For the Hopis, the collection of feathers from these birds has a great deal of religious significance, and are difficult to find outside of protected areas (religious/social rationality). Such an action was cited as being illegal, and the superintendent of the park region refused to allow any hunting on park lands on legal grounds that hunting of any kind in national parklands is outlawed (legal rationality). Assistant Secretary for the Interior Don Barry overruled the superintendent, explaining that although he understood the legality issue, Secretary of Interior Bruce Babbitt wanted to accommodate the Hopi's request. Babbitt wanted to prevent the issue from becoming highly visible, and urged the park employees to avoid all questions on such a thorny issue (political rationality). In response to news that the Department of Interior was allowing the hunting request, environmental groups started legal and journalistic actions against the government (environmental rationality), which soon forced the Hopis to withdraw their request.(61)

In such political situations, disagreement over issues is both commonplace and normal. Different actions can seem entirely appropriate to the different parties involved, and each believes that they are doing the right thing. As in the preceding example, if one takes the view that action is only possible as long as it does not conflict with the law, then this assumption of legality blocks alternatives which would be open to others who value political gain over the legal values of such actions. Questions of 'right' or 'wrong' can only be made in reference to these underlying assumptions. Conflict is inevitable as long

61. Public Employees for Environmental Responsibility (PEER). 2000. "Interior to Open Parks to Native American Hunting." *PEERreview*. Spring 2000, pp. 1 & 12.

as people hold differing beliefs over the importance of these values. A hope often exists, however, that some neutral ground exists beyond these conflicts, that rationality can go beyond disagreements and establish irrefutable truths regarding any situation. The belief has evolved that all that is necessary is the right amount of information, for reality will show people the one truth.⁽⁶²⁾ These ideals have had an enormous impact upon politics in the modern age.

The Background of Science and Political Power

The ideal of certainty is hardly a new notion. To attribute such a belief only to the modern age would hardly explain religious and political differences of the past. The persistence of such a belief in contemporary life is generally blamed upon science, whose models of empirical reality have inspired hope that such methods could reduce conflict and discord. The absolute rationality sought by Robespierre or the faith in science held by the founders of the American states was claimed to be of a different nature than what had passed before.⁽⁶³⁾ Truth was no longer to be given, as in Christian or Platonic beliefs. Rather, truth could be discovered, and from this grew a belief that the laws of nature could be extended as easily to human conduct as any other part of nature. All that was necessary was complete information, and this was provided by the methodologies of

62. See the discussion of this in Roger Trigg. 1993. *Rationality and Science: can science explain everything?* New York: Blackwell Publisher.

63. I. Bernard Cohen. 1995. *Science and the Founding Fathers*. New York: Norton.

science.(64)

Such claims are slightly misleading, however. Science and modern rationality are closely related, but it is important to note that concepts of local versus universal descriptions of reality did not begin with science. It is true, that with the decline in authority the Catholic Church in Europe was not able to exert the power it had previously held in determining people's beliefs, and much of this 'foundational' knowledge passed to technical experts and scientists.(65) Much of this progression came, however, from a larger process which changed the nature of knowledge, a process began in the thirteenth century. This change was characterised by a shift from qualitative to quantitative measurement and visualisation, from local to universal knowledge. Previously, accounts of the nature and rhythm of the universe stemmed from locally shared concepts, constructs which generally made sense only in a local context. This slowly changed to a more mechanised view of the universe, one more akin to the clockwork model made popular (much later) by Robert Boyle.(66) As the historian Alfred Crosby described,

The shift toward quantitative measurement and procedure was, in its initial stages, not as immaculately rational as we, who view it through the medium of succeeding centuries of habitual quantification, may think. The shift was part of

64. Carolyn Merchant. 1980. *The Death of Nature: Women, Ecology, and the Scientific Revolution*. San Francisco: Harper and Row.

65. Hannah Arendt. 1961. *Between Past and Future*. London: Faber and Faber, pp. 31-54.

66. Robert Boyle. 1996 [1686]. *A Free Enquiry into the Vulgarly Received Notion of Nature*. Davis and Hunter (eds.) Cambridge: Cambridge University Press.

something subliminal, a sea change of *mentalité*.(67)

These changes made possible the rise of modern science in the seventeenth century, as Newton and his contemporaries worked from a model of the universe which differed drastically from the 'organic' world of previous times.(68) So, too, did the notion of rationality change.

Notions of epistemology were entirely different than before, as were expectations of the ability of science to describe all laws of the universe. After all, if the laws of motion in the heavens could be explained with such exactness, why not events on earth? If concepts of heat could be reduced to quantified measurement, then why not happiness and loyalty, as well? And if everything could be calculated, then it also could be controlled. This, for Weber, was the central argument of modern government, and heralded the appearance of modern, institutional rationality.

The essence of rationalization, for Weber, was a central 'belief' of modern culture that 'there are no mysterious incalculable forces... that one can, in principle, master all things by calculation.'(69)

Weber seems to represent the contemporary understanding of rationality as it is applied to state and society. His definition, that rationality is an outgrowth of the scientific view of the world, has been adopted as a means of describing a world which has

67. Alfred Crosby. 1997. *The Measure of Reality: Quantification and Western Society, 1250-1600*. Cambridge: Cambridge University Press, p. 131.

68. *Ibid.*, pp. 3-74.

69. Douglas Torgerson. 1990b, *op. cit.*, pp. 22-23.

become detached from the realities and personal experiences of people and the environmental world. Weber's use of the term 'rationality' contains an implicit link with the scientific view of the world, or his work has been interpreted to indicate that such a relationship exists.⁽⁷⁰⁾ Upon closer inspection, however, this view of rationality, the one so often used in describing modern bureaucracies, is of a particular kind. To state that rational organizations did not exist prior to the scientific age, would be to imply that all those living before the seventeenth century were irrational. But are modern organizations any better at their tasks than their feudal or ancient Roman counterparts? Such a judgement can only be made in reference to specific contexts.

When Weber talks about 'rational' authority or bureaucracy, it can be inferred from what he says about these phenomena that 'rational' can be replaced by 'formally and elaborately organised' and 'rationalisation' by 'the growth of elaborate formal organisations' or 'the process of becoming more elaborately and formally organised.'⁽⁷¹⁾

In other words, the growth of rationality and its central belief that a set of objective criteria can exist, independent of local context or incommensurate beliefs, is not directly linked to science. True, much of what has occurred in the name of science has drawn its authority from the successes of such research. Science has also often been enlisted in developing technologies for evil purposes. But the important point is that, when considering the growth and development of modern bureaucratic governments, nothing in

70. See, for example, Al Gore. 1993. *Earth in the Balance*. New York: Plume Books.

71. Stanislaw Andreski. 1984. *Max Weber's Insights and Errors*. London: Routledge, p. 73.

that development exists to make bureaucracies inherently favourable to science. Although many have suggested or assumed that a direct link exists between the rise of science and the rise of administrative government, this is not necessarily the case.

Bureaucracies may find it incredibly useful to draw upon scientific authority for their legitimacy. In the end, however, their beliefs rest upon constructions formed in parallel with scientific achievements, not because of them. For this reason, scientific research and bureaucratic processes contain different values, for their aims are not similar, nor are the contexts under which they normally operate. On the contrary, what makes science successful may be quite the opposite for an efficient bureaucratic organization.

This point is raised because it is important to reemphasize that everyday and academic uses of 'science and rationality' are muddled. If people believe that to be scientific is to be rational, and that administrative agencies are inherently rational, they may conclude (erroneously) that administrative agencies are basically scientific in their operation and legitimation. Even though such a myth proves useful for administration, it can easily reinforce notions of scientism and suppress criticism. It is just this possibility that is of most interest in this research, and there exist a number of specific ways in which science is undermined in administrative operation.

The analysis of science in organizations may now turn from definitions and science, to the nature of bureaucratic agencies and the values they embody. By doing so, contradictions in the aims and values of the two enterprises stand out, making it apparent why science cannot survive in a bureaucratic atmosphere. If it is now possible to see why

so much confusion has existed with the terms science and rationality, it is vital to explore the impacts this has had upon public policy.

Chapter Three

Administrative Processes and Scientific Methodologies

A great deal of intelligence can be invested in ignorance when the need for illusion is deep.

-Saul Bellow

Science Within Administrative Politics

Following the establishment of a working definition of science, one based on conditional truth and consideration of alternatives, this chapter turns to the more applied notion of how science operates within administrative institutions. Although such institutions vary greatly in form and function, many similarities exist as to how they handle information processing, accountability, and problem definition in hierarchical political structures. By tracing the nature of scientific research within the background of political institutions, in essence combining the work of some areas of philosophy of science with public administration and policy, several issues can be more easily addressed. Beginning with concern over the accountability of the political process where scientific issues are involved, this chapter aims to show how idealized portrayals of science in administration often fall far short of the ideal.

This is not meant to imply that politics and science can or should be kept separate. Despite the wishes of the more 'traditional' philosophers of science, that the hypethico-deductive method can remain free from values and attain 'knowledge without a knower', in practice this is often not the case. In practice it is impossible to separate scientific

inquiry from the political environment in which it operates. At the same time, however, the political process shapes science in certain ways that should make one question the nature of just how 'scientific' the research has remained. Many of its conclusions may have been altered or predetermined by criteria other than those used within science itself. Questions which led policymakers to rely upon technical answers may not have been appropriate. Influences in the process may be either bias or merely contextual values. Even if politics cannot be separated from science, can it still remain distinguishable?

The Presence of Scientific Uncertainty

One of the primary reasons given in Chapter 1 for why science cannot answer political questions lies with the large presence of uncertainty in scientific research. No matter how predictive science may be in the laboratory, the ability to apply such knowledge to the larger world is often quite problematic. Abstract notions of *ceteris parabis* conditions do not apply to the real world, and even if models are correct and applicable universally, then measurement can provide an insurmountable hurdle in applied science.

As Einstein put it, insofar as the laws of mathematics refer to reality, they are not certain; insofar as they are certain, they do not refer to reality.(1)

In the ecological sciences, the problem is acute. As many authors have noted, ecological systems are so complex, and their underlying processes still inadequately understood, that

1. Kristin Shrader-Frechette. 1996. "Methodological Rules for Four Classes of Scientific Uncertainty", in : *Scientific Uncertainty and Environmental Problem Solving*. Lemons (ed.), London: Blackwell Scientific, p. 17.

any models created for ecology are neither universally valid nor empirically verifiable.

The standard hypothetico-inductive model of scientific inquiry, the model most favoured by the strong positivists in the hard sciences, is not a research method particularly appropriate for ecological studies.(2) Ecologists cannot assume that understanding of component parts of a system will allow for aggregate knowledge, for the complex interactions of networks within ecosystems prevent such extrapolations from reductionist models.(3) While discussed in greater detail elsewhere(4), it is important simply to note that however valuable scientific research may be in increasing knowledge of environmental systems, the research completed is neither certain nor predictive. Ecology can rarely achieve the 95% certainty required of many studies to claim that their results are 'conclusive', yet failure to do so may be interpreted as meaning that even strong probabilities do not exist.

Scientific versus Administrative Uncertainty

Scientists and those in administration will generally choose to treat uncertainty

2. John Lemons. 1996. "The Conservation of Biodiversity: Scientific Uncertainty and the Burden of Proof", in : *Scientific Uncertainty and Environmental Problem Solving*. Lemons (ed.), London: Blackwell Scientific, pp. 218-220.

3. John Cairns and Eric P. Smith. 1996. "Uncertainties Associated with Extrapolating from Toxicological Responses in Laboratory Systems to the Responses of Natural Systems", in : *Scientific Uncertainty and Environmental Problem Solving*. Lemons (eds.), London: Blackwell Scientific, pp. 188-205.

4. See Kristin Shrader-Frechette and E.D. McCoy. 1993. *Method in Ecology: Strategies for Conservation*. Cambridge: Cambridge University Press; Shrader-Frechette. 1996, *op. cit.*

differently. Scientists' values posit that it is better to minimize Type I uncertainties, in order to limit false positives. That is, rejecting a theory that might be true is better than accepting one that might be false. This creates a conservative approach to research questions, entirely in line with prescriptions for scientific appraisals of evidence.⁽⁵⁾ It is better to be too rigorous in criticism than too lax. This accepts uncertainty as part of the process, as often results are inconclusive. Claiming that one does not know is (scientifically) better than asserting without adequate cause that one does. Yet this view and expectation of science, that of conditional and highly uncertain conclusions, is not the perception or promise of science which exists in the public realm.

That this misunderstanding persists should come as little surprise, however, for it is in the institutional interests of both scientists and the administrative state to make such claims, that science can provide the one, correct answer. For scientists, the nature of funding at the university and government levels creates a large incentive for them to claim that their research is policy-oriented. Very often, one hears the claim that even if a study on risk cannot be conclusive, all that is necessary for closure in the issue is support for 'further study'. This institutional myth creates a background for expectations that science can, indeed, provide the necessary answers to resolve ethical and social disputes.⁽⁶⁾ When scientists return with less than what they promised, a disjuncture occurs.

5. Shrader-Frechette. 1996. *op. cit.*, pp. 20-23.

6. Susan Haack. 1996b. "Preposterism and its Consequences", in : *Scientific Innovation, Philosophy, and Public Policy*. Paul, Miller, and Paul (eds.), Cambridge: Cambridge University Press, pp. 296-315.

... politicians and civil servants often become disappointed with scientists due to all the doubts they often express. Their lack of clear-cut answers and views on many issues where arguments are based on probability and risks adds to this. They [scientists] often emphasize that they do not know for sure and even that opinions may differ within the scientific community.(7)

This comes in stark contrast to many promises for policy-ready information made at the time of funding and grant proposals. It is perhaps not surprising that those expecting clear answers will be disappointed when such responses fail to arrive. The response of the administrative institutions involved may be to give the impression that such full information is, in fact, available to them. Despite academic work to the contrary since the 1950s, most citizens in North America and Europe conceive of political rationality as needing to work with only full information. Anything less than that is thought to create sub-optimal policy outcomes.(8)

In order to maintain legitimacy, administrative institutions must then do one of two things. Either they must accept that the decisions they are making are based upon uncertain information and explicit political judgements, or they must give the impression that the decisions made are based upon information which settles all disputes and therefore requires no discretion. Choosing to accept and acknowledge uncertainty requires acceptance of political accountability, and because of the nature of the burden of proof in environmental affairs, it also requires that one must take responsibility for both action and

7. Hans Skoie. 1993. "Science and technology advice to governments- a Norwegian perspective." *Science and Public Policy*. 20, 2, p. 82.

8. Wade Robison. 1994. *Decisions in Doubt*. Dartmouth: University Press of New England.

failure to act. It is a weaker basis for authority in politics, for discretion and judgement are only meant to be taken in reference to outside universal criteria of science. The latter choice, on the other hand, requires neither political responsibility nor accountability. Political actors can either postpone any action by arguing that not enough information is available, or make decisions in ways that hide other goals behind a facade of technical neutrality. When faced with the problem of scientific research that one cannot directly apply to political issues, the temptation is to make it fit, to change results or to invoke the name of science in drawing conclusions.

Goal Displacement

Perhaps not surprisingly, the choice of invoking science is the more common route. This is a process known as goal displacement, because whether one takes action or not, a political decision was made. Yet decision-makers do not acknowledge this decision as such, and it therefore requires no associated accountability.⁽⁹⁾ Under the instrumental vision, one need only be held accountable if a decision-maker made subjective judgements, not if decisions were based upon the hard reality of scientific evidence. Yet in administrative institutions, often no one will know the difference. This process acts as a substantial incentive to use information in ways which do not fit with scientific inquiry, because it fits the definition of false and fake reasoning laid out earlier. In the words of

9. Carl F. Jordan and Christopher Miller. 1996. "Scientific Uncertainty as a Constraint to Environmental Problem Solving: Large-Scale Ecosystems", in: *Scientific Uncertainty and Environmental Problem Solving*. Lemons (ed.), London: Blackwell Scientific, pp. 109-110.

Michael Harmon,

Goal displacement will be defined here as the tendency of professionals to seek personal gain by disguising political action under a veneer of neutral or technical competence. To a degree, at least, it is an act of deliberate bad faith, and whether or not the assertion of its presence is justified in any particular case, it is reflected in a profound public distrust both of the bureaucracy and the professions.(10)

The ability of administrative institutions to transfer blame for the lack of a policy consensus upon science, often results in the sciences losing their status of legitimacy within politics. Recall Karen Litfin's comments concerning the spiral of delegitimizing claims in science-oriented political disputes. The ability of one side to make assertive claims is undermined by scientific claims to the contrary from opposing political sides.(11) The result is a loss of status for science, and the growing belief that science is merely a political argument.

What is to Blame?

In response to criticisms that something is amiss in administrative operations, two general responses emerge. The first is to argue that science is not being done correctly, with the conclusion that if only the science can be done right, then more effective policy can follow. This is the logical positivism tradition, and manifests itself when politicians claim that decisions will be based upon 'science, not politics.' The other argument is to

10. Michael Harmon. 1990. "The Responsible Actor as 'Tortured Soul': the Case of Horatio Hornblower", in : *Images and Identities in Public Administration*. Kass and Catron (eds.), London: Sage Publications, p. 161.

11. Karen Litfin. 1994. *Ozone Discourses*. New York: Columbia University Press, p. 36.

claim that science is essentially a political process, itself, so that no distinction can or should be made between the actions of political authorities and the content of the associated science. A third question is even more important: what if science is not being done at all?(12) One can then define the problem differently. Rather than perceiving a lack of objectivity in science, one can trace the failure of policy to manipulation of information and goal displacement. This means that we should recognize and incorporate the nature of scientific uncertainty into decision-making, for efforts to alleviate its presence while continuing to assert that it should not exist, can only harm both science and politics.(13)

Critics are often correct in asserting that the influence upon science in policy is entirely political, yet that which is being influenced may not be science at all. The confusion is understandable. As mentioned, too often we have conflated concepts of science with various forms of rationality or technicism. Rationality has also been confused with particular structures of central hierarchical government. It is therefore not much of a stretch to confuse the processes of the administrative state with science, and in trying to discredit the technical fallacies of the policy process, subtle but important distinctions can be lost. Critics have every right to question the legitimacy of the process, but the consequences of focussing upon the wrong target can be worse than doing nothing

12. Sian Sullivan. 2000. "Getting the science right, or introducing science in the first place? Local 'facts', global discourse - 'desertification' in north-west Namibia", in : *Political Ecology: Myth, Science and Power*. Stott and Sullivan (eds.), London: Edward Arnold.

13. Robert B. Gibson. 1992. "Respecting ignorance and uncertainty", in : *Achieving Environmental Goals*. Lykke (ed.), London: Belhaven Press, pp. 158-178.

at all. Not only do policies fail to change, but potentially valuable contributions from the environmental sciences can be lost in the process.

In order to help remedy this situation, this chapter continues by elaborating upon the mechanisms by which information and scientific evidence are handled (and mishandled) within administrative institutions. This theoretical section, which employs research done within public administration and public policy, is admittedly limited in the general claims it can make. Institutions vary greatly in time and space with regards to both form and function. Likewise, claims made in reference to general organizational processes have limited utility in predicting future policy situations. As a result, three case studies (Chapters 4, 5, and 6) will apply ideas of the first three chapters in contextual formats, to show how similar processes can occur in differing countries and political cultures.

Instrumentalism as an Institution

How Organizations and Institutions Differ

Science must operate in administrative organizations, institutions which often produce behaviour distinct from the sum of its parts. The manner in which science is handled in organizations is not determined solely in reference to the scientists themselves, nor is it sufficient to extend the analysis to the regulative structures of specific organizations. One can only fully understand information processing within the context of larger political institutions, the artifacts or cultural environments of a society. Much of the

work of administration is to make scientific information somehow 'fit' into its ways of thinking, or its political rationality. More often than not, scientific information must be 'translated' to accommodate several overlapping institutions at once.

If organizations are the visible legal and structural entities of the administrative state, Scott best describes institutions as the "formal and informal rules and procedures that structure conduct." (14) The organizations under study, be they government agencies or political parties, are the more specific structures created within an institution for the express purpose of representing a collection of interests or accomplishing some goal (political organizations and action organizations). One cannot understand the capabilities and preferences of the actors in a political study except as part of the larger institutional framework. Institutions are not simple aggregations of individual behaviour, and are not explanatory by way of micro-economic methodologies. People both create institutions and influence them. Institutions focus thought and help to define what people's identities are and what they value. (15)

Focussing and defining are influenced by the cognitive, normative, and regulative structures contained within such institutions. The cognitive structures constrain thought and help to define which actions may be considered rational; they exist by providing ready-made concepts by which people can define and categorize the rest of the world. Normative structures define the roles people have within the institutions, and say which

14. W. Richard Scott. 1995. *Institutions and Organizations*. London: Sage Publications, p. 26.

15. *Ibid.*, p. 33.

actions are the most desirable. It is a way of saying what should be done. The regulative structures are those laws and mechanisms by which the institutions operate. They are the rules (whether explicit or implicit) which define the operation of the institution.(16)

Organizations (as distinct from institutions) are the legal and most visible embodiment of such institutions, and are designed to work within the institutional framework.

'Mechanism' as an Institution

Some overlapping institutions regarding the use of science in Western society have already been alluded to. The faith in scientism, the belief that leaders can fruitfully apply science to all manner of ethical and social issues, is a legitimating force of many forms of modern government. This modern administrative state is the one so well described by Weber, of the central technocracy based upon Hobbesian political ideals.(17) This is a pervasive mode of thinking, one based as much on Hobbes as it is upon the mechanistic 'clockwork' vision on the world first developed in Europe during the thirteenth century. As Alfred Crosby describes, it is this vision which has preceded both modern science and bureaucracy, and helps to legitimate both in the collective imaginations of states' citizens. This 'New Model' of the world, a quantitative and visual approach so different from what had come before, provided the basis for much of the modern state and modern science.

16. *Ibid.*, pp. 33-44.

17. Max Weber. 1978. *Economy and Society*. Berkeley: University of California Press, pp. 954-975.

The New Model offered a new way to examine reality and an armature around which to organize perceptions of that reality. It proved to be extraordinarily robust, providing humanity with unprecedented power and many humans with the comfort of a faith- it lasted for centuries- that they were capable of an intimate understanding of the universe.(18)

The administrative state and modern concepts of political instrumentalism evolved in response to these beliefs. The essence of the administrative state was its particular brand of rationality, a form which believed that it could homogenize and bring all information under control, that there were no events which could not be explained.(19)

The ideologies of modern politics were direct descendants of the earlier 'New Model', and relied upon the authority of science to maintain its claims to authority. Once this tradition had been established, and the artifact of bureaucracy brought into its mature form in the twentieth century, other forms of legitimacy were lost to the state. Neither wisdom nor tradition had any independent authority, meaning that knowledge-as-power would be held most effectively by the state itself. Note that this is distinct from saying that the state held the best or most accurate information. Its authority simply drowned out other voices.

Control of information was, indeed, a primary objective of some early governments after the French Revolution, when rulers deemed local knowledge

18. Alfred W. Crosby. 1997. *The Measure of Reality: Quantification and Western Society, 1250-1600*. Cambridge: Cambridge University Press, p. 239.

19. Douglas Torgerson. 1990b. "Obsolescent Leviathan: Problems of Order in Administrative Thought", in: *Managing Leviathan*. Paehlke and Torgerson (eds.) Peterborough, ONT: Broadview Press, pp. 22-23.

inappropriate and they forced into service methods of a universally applied science.(20)

As Octavio Paz wrote,

. . . the universality of science (or what passes as science) justifies the elaboration and imposition of collective patterns of normality . . . the imposition of rules that condemn all singularities.(21)

The growth of universalism did create a dilemma. The growth of instrumental visions in Western governments was premised upon certain basic assumptions in order to maintain states' legitimacy. The ability of governments to sustain these visions was limited, however, because of the inherent limitation of the scientific methods used to legitimate actions. The alienation of the modern world, as described by Arendt and others, created a need to maintain a technically derived state, without the vices and fallibilities of a polis based upon moral visions. But the growth of technicism created a dilemma of accountability.

From Clockworks to Instrumental Action

In order to sustain the vision of a neutral and objective state within liberal democratic values, the technical and scientific bases for government had to create a way of measuring and assessing the performance of actors within the system. Actors were made accountable by reference to the technical competence they displayed.

20. Theodore Porter. 1995. *Trust in Numbers*. Princeton: Princeton University Press.

21. As quoted in: Yaron Ezrahi. 1990. *The Descent of Icarus: Science and the Transformation of Contemporary Democracy*. Cambridge, MA: Harvard University Press, p. 47.

Politically the replacement of moral restraint by technical discipline made it possible to endorse instrumentally guided actions as a category of actions which, consistent with liberal-democratic norms, are neither arbitrary nor controlled by passions or personal caprice.(22)

As stated earlier, however, the assumptions upon which such a vision were based cannot be sustained without question. The belief that a neutral technicism governs actions, rather than a more political (and hence, 'subjective') method of judgement, must rely upon the transparency of the system to review by outsiders. In the case of administrative politics, transparency means that the citizens-as-spectators must have a role to play in the process, even if it is merely to keep track of the actions carried out in their collective name.

Without the ability to make such judgements, to gauge how well actions have been carried out in accordance with scientific norms, the methods of accountability are lost. Recall that actors within the administrative state were not meant to exercise judgement on their own, for even a Hobbesian concept of government relies upon rule by reason, and not by partisan politicking (although such a division may be quite artificial). Unless the administrators act upon mechanical rules by which they are to reach decisions, they are acting on their own judgement and without the input from those they govern. Such a system is thus at least partly autocratic.

This third vision of instrumentalism, of the enlightened rule by a few, is difficult to maintain in concordance with democratic values for the same reason that political science has had difficulties in studying public administration. Democratic administration relies upon the ability to judge actions based upon their outcomes. Political actors are to

22. *Ibid.*, p. 60.

be held accountable in reference to the outcomes of the policies they establish or administer, and by implication, one could judge the intentions of those actors according to what they have accomplished. These stipulations for accountability in government are based upon rational choice models of organizational behaviour, which assume that process is not a problematic issue, only one to be properly mapped out. The instrumental vision, however, falls prey to conflicting expectations from the institutions within which it operates. Behaviour will conform to these expectations only insofar as it serves to legitimate itself. Any conflict between competing expectations of instrumental action may well result in either outcome or process favoured over the other.

In assuming certain behaviour in policy, these institutions of instrumentalism presume that actions and associated outcomes are deliberate, controllable, and based upon the best information available. In essence, the political institutions based upon the New Model of mechanistic governance, expect that the manner in which policy is formed and implemented is fully compatible with scientific research. The following section elaborates upon these assumptions and the difficulties encountered in sustaining such assumptions of policy. Unlike the institutional ideologies which claim that science and administration exist side by side, just the opposite often occurs. The discussion can then turn to explanations of why such assumptions continue to persist, and how they relate to the actual operations within administrative institutions and organizations. Such explanations include the work of Brunsson and 'action organizations', problems of administrative language and uncertainty absorption developed by writers like March and Simon, and the nature of administrative politics as seen by Arendt and van Gunsteren.

The Myth of Rational-Scientific Policy

Past Studies in Public Administration

One cannot simply assume that policy outcomes were those intended by associated actors. The traditional rational actor model argued that the policy process was essentially linear, and the outcome of any policy was the direct result of rational deliberation among participants and corresponded in some way to their choice among alternatives. This notion of perfect rationality has persisted for a great many years, reinforced by the need of such a vision to sustain normative concepts of modern government. The notion of a 'machinery' metaphor for government, in which control could be effectively exercised from the top, where change only occurred as a result of deliberate action, has remained strong despite its many failings.(23) It has survived because of the power of the New Model for explaining and making sense of the world, and was made acceptable in the academic literature by, among others, the works of Max Weber.(24)

Despite the appeal of the New Model and the machinery metaphor for government, public administration and public policy theorists could often only lay down idealized rules for how an organization should behave. The linear, step-by-step process developed by Harold Laswell to describe administrative and policy procedures was

23. See Christopher Hood. 1979. *The Machinery of Government Problem*. Studies in Public Policy #28. University of Strathclyde, Glasgow, UK.

24. Weber. 1978, *op. cit.*

intended to be as much a normative as descriptive device.(25) Problems arose, however, when in the 1950s studies in public administration began to uncover empirical evidence that decision making within organizations does not follow such simple, idealized rules. This empirical work identified problems in defining policy-making and implementing steps in terms of discrete cognitive and political actions, rather than as a set of overlapping, circular steps.(26)

The legitimacy of the modern political process relies upon the assumption that policies are being formulated in terms a rational, linear process. Under this (often American) vision, a legislative authority writes laws under a mandate from the electorate. These laws are then passed along to the executive branch, that enforces and implements them in the same fashion as was intended by the legislature. The purpose of the technically trained bureaucracy is purely to provide impartial advice to the legislature, and to provide (neutral) technical bases upon which a policy can be implemented. This argument supplies the neat separation between public policy and public administration, for under administration no forms of independent policy formulation is to take place. The bureaucracy may have the expertise, but they lack the political authority to undertake policy decisions independent of elected bodies.

In the US, this ideal has been held to a large extent since the end of the Second

25. Harold Laswell. 1956. *The Decision Process*. College Park: University of Maryland Press.

26. See Hank Jenkins-Smith and Paul Sabatier. 1993. "The Study of Public Policy Processes", in : *Policy Change and Learning*. Sabatier and Jenkins-Smith (eds.), Boulder: Westview Press, pp. 1-9.

World War, when Congress adopted the Administrative Procedures Act (APA) of 1946, giving administrative agencies directions to form rule-based guidelines upon which they were to act. This movement away from contextual or case-by-case approaches follows a belief in the ability of general guidelines to be applied fairly across a wide spectrum of possible cases. Experts supposedly knew best when it came to complex or scientific issues, and were largely left to their own devices when it came to policy formulation. The bureaucracy is simply supposed to know what is expected of them, and what the best course of action will be to achieve goals set out by the legislature.

For example, the environmental legislation passed in the United States in the early 1970s was vague in nature, and meant to be transformed into technically accurate policy by the Environmental Protection Agency (EPA) and related agencies.

A wide range of broad mandates was imposed upon the newly-created EPA and sister agencies, and further covered under the Clean Air and Clean Water Acts, the Resource Conservation and Recovery Act, the Safe Drinking Water Act, the Food Quality Protection Act, and the Federal Insecticide, Fungicide, and Rodenticide Act, among others.⁽²⁷⁾ The mandates held that either the EPA or the states had to set quality standards related to the above acts, based upon available knowledge and set out in language that often reflected “adequate margin of safety” or “ample margin of safety” clauses.⁽²⁸⁾ As Paul Portney writes, the demands placed upon the EPA were tremendous.

27. Mark R. Powell. 1999. *Science at EPA*. Baltimore: Johns Hopkins University Press, pp. 2-11.

28. Paul R. Portney. 1990. “The Evolution of Federal Regulation”, in : *Public Policies* (continued...)

...the clean air and clean water laws promise “safe” air and water quality, call for the establishment of literally tens of thousands of discharge standards, mandate the creation of comprehensive monitoring networks, and impose numerous other important tasks on the administrator of the EPA. Yet the laws allotted just 180 days for the completion of many of these responsibilities.(29)

In many cases, failure to implement standards meant that so-called ‘hammer’ clauses would come into effect. These were provisions that would take effect should the EPA or other agency not be able to provide their own standards within a given period of time. These hammer clauses would impose standards at that time which would be much tougher than those adopted by the agency, thus forcing the EPA to adopt Congress’s own standards within the prescribed time allotment.

Often, these Congressional standards would be made deliberately and unreasonably strict, as an ‘incentive’ for the EPA to find its own standards within the given time periods.(30) But as mentioned, such clauses assumed that the time periods allotted would be enough time to make the correct determinations.(31) The point of the matter is that the guidelines set out by Congress were necessarily or deliberately vague, requiring cognitive bridges to be made by either the scientists or administrators in terms

28.(...continued)

for Environmental Protection. Portney (ed.), Washington, DC: Resources for the Future, pp. 3-27.

29. *Ibid.*, p. 22.

30. Walter Rosenbaum. 1995. “The Bureaucracy and Environmental Policy”, in : *Environmental Politics and Policy*. Lester (ed.), Durham: Duke University Press, pp. 206-241.

31. In reality, many of those standards called for in the 1970s have yet to be established.

of what the priorities were and what was the best way to approach those problems. This left many decisions to be made without the benefit of full information, which remains one of the most important assumptions regarding rational action. A disjuncture appeared between symbolic logic and coherent legislation.

The process of implementing policy was thus never as clearly defined as traditional rational-actor models insisted should be the case. Much as the semi-satirical 'garbage can' model of organizational behaviour set out by March and Olsen, policy in practice has neither discrete beginnings nor end-points.⁽³²⁾ The traditional model of rational choice posits that policies are chosen after goals are clearly established within an organization, when full information regarding the consequences of each alternative is available, and then the best alternative is chosen with the organization acting as a coherent whole. In short, the organization acts according to the mechanical order of the world as a form of political symmetry. With its reliance upon scientific and technical information, it manages to elude the political nature of discord and inefficiency prevalent in elected government. On the contrary, report March and Olsen,

It has been observed that individuals fight for the right to participate in decision-making, then do not exercise that right with any vigor; that organizations ignore information they have, ask for more information, then ignore the new information when it is available; that organizations buffer processes of thought from processes of action; that managers spend substantial amounts of time in activities that appear to have few consequences beyond acknowledging the importance of others, as well as themselves; that minor issues create a governmental crisis and unexpected patterns of political activation, then drift away again; that

32. M.D. Cohen, James G. March, and Johan P. Olsen. 1990. "A garbage can model of organizational choice", in: *Decisions and Organizations*. March (ed.), Oxford: Blackwell Publishing, pp. 294-334.

organizational participants contend acrimoniously over adoption of a policy, but once the policy is adopted, the same contenders appear to be largely indifferent to its implementation, or lack of it.(33)

The above quotation illustrates how those working within administrative organizations do not follow the ideal of rational action, at least in the ideal, scientific form which still persists within public discourse.

Public Expectations and Political Actions- Why Science Hinders Government Action

Even if people are aware that such organizations fall short of their expectations, the fact that such expectations exist is important, for they create a normative environment in which actions are compared to the ideal. In other words, community standards still exist which judge policy processes based upon their ability to solve problems with scientific evidence. The more scientifically defined the problem, the truer this becomes. As a result, public administration reacts in ways which attempt to live up to the ideal which makes the above quotation seem so remarkable. The cognitive dissonance surrounding what March and Olsen reported only exists because people do not want to believe such behaviour to be true.

People carry an equal expectation that things get done in government, and this is not necessarily compatible with their desire for things to be done according to scientific methods. In fact, it may be argued that in order for anything to be accomplished by state

33. James G. March. and Johan P. Olsen. 1986. "Garbage can models of decision making in organizations", in: *Ambiguity and Command: Organizational Perspectives on Military Decision Making*. March and Weissinger-Baylon (eds.), Cambridge, MA: Ballinger, pp. 16-17.

administration, use of scientific rationality (as opposed to false reasoning) is not an ideal choice. The use of full information, consideration of all practical alternatives, and changing priorities in light of new information, are not attributes of bureaucracies that wish to accomplish anything significant; they would simply be flooded with information and paralysed by too many possible alternatives of action. One might hope, of course, that questions of (democratic) process are not antagonistic toward questions of outcome. Unfortunately, this is what much research in public administration suggests.

In any given state there are institutional ideologies which favour certain actions by the government, and these are generally far easier to measure than are questions of process. Questions of process and outcome are not always commensurable, and as long as the process can remain hidden behind administrative secrecy, the outcome becomes the more important of the two. Water resource management agencies, for example, are most often expected to produce something tangible for their efforts, be it a dam, irrigation project, or river diversion. Questions of process are not primary for the agency's existence. Unless that organization can actually build something, then its purpose is put into doubt.

Building dams is what the US Bureau of Reclamation is good at, and within that area it is considered to have among the best water engineers in the world. It was not created to concern itself with anything other than building dams. All that is necessary for an organization such as the Bureau of Reclamation is to *appear* to be following the process dictated by institutional ideologies. If the organization is designed in particular ways, this is not difficult to accomplish, because actions such as rational decision-making

according to scientific evidence need only be symbolic. The dams, on the other hand, can hardly be illusory. Either they exist, or they do not. Either they stand, or they collapse. Therefore, their existence is far more important to the organization than questions related to how they came to exist.

Restricting Choice in Decision-Making

For 'action organizations' such as Nils Brunsson describes, the outcomes they desire, and which are expected of them, require that they design the organization in such a way that processes of thought are limited. As long as outcomes (e.g., dams) are more visible than the processes by which they are decided upon, such organization is often the preferred alternative. This limiting of thought in favour of organizational or institutional ideologies has a negative impact on the ability of the organization to process information so that it may remain scientific. Administrative politics may easily become a process whereby false reasoning becomes the norm, and where scientific research proves detrimental to the immediate goals of the organization. "To put it bluntly, the action organization makes people narrower or stupider than they were before they joined it."(34)

The most effective action organizations, Brunsson claims, are those which can effectively implement three central ideas, all of which contribute directly to false reasoning and bias values. First, the organization must reduce alternatives of choice, so that only the choice preferred from the beginning of the process has any chance of being

34. Nils Brunsson. 1989. *The Organization of Hypocrisy*. New York: John Wiley and Sons, p. 16.

selected. In the case of water management agencies, this choice is generally quite obvious, for their preference would be one in which the largest project can be built within the resources available to the organization. Alternatives may include slight variants of the original project, but non-structural alternatives (the alternative of doing nothing) will only be included if mandated by higher authorities. Even then, these alternatives are presented in such a way so as to make their adoption extremely unlikely. The most effective organizations present alternatives which only reinforce the institutional ideologies of the process.(35)

For example, in the environmental assessments drawn up by the Bureau of Reclamation (BuRec) for the Animas-La Plata project (ALP), ten possible alternatives were given for construction. This included a non-structural alternative, although the inclusion of such an option had been mandated under the National Environmental Policy Act (NEPA), and critics of the ALP had to press for its direct consideration.(36) It was fairly obvious in the assessment, however, that only one alternative was being actively considered by BuRec. All others had only negative comments attached to them, concluding (even before sections concerning evidence had been introduced) that other options were simply not feasible, and at worst, would cause substantial conflict.(37) By

35. Nils Brunsson. 1985. *The Irrational Organization*. New York: John Wiley and Sons, pp. 23-25.

36. Earthjustice Legal Defense Fund. 2000. *Comments on the Animas- La Plata Draft Environmental Impact Statement*. Letter to Pat Schumacher, US Bureau of Reclamation, 17 April 2000.

37. US Bureau of Reclamation. 2000. *Animas-La Plata Project; Summary of the*
(continued...)

not allowing other options to be given due consideration, the job of getting the dam built becomes much easier for agency personnel. This example will be examined in more detail within the case studies.

Imagining Certainty

The next consideration is to reduce uncertainty regarding the consequences of future actions, primarily by ignoring them. To assess all possible consequences of any given alternative would only serve to cause doubt, and doubt causes paralysis in action. Therefore, the most efficient organizations only focus upon the positive consequences of their actions, and suppress any discussion of negative effects.⁽³⁸⁾ This focus creates an atmosphere wherein decision-makers can be sheltered from the necessity of making hard choices which might impugn their consciences, and makes outward explanations of their rationales all the more reasonable. After all, if one was not made aware of negative considerations, how can he be held fully responsible for his actions? Within environmental policy, this second consideration becomes especially important, because the nature of uncertainty in ecological sciences makes it convenient to explain away ignorance in reference to the uncertainty of conclusions. Especially in cases where the benefits, such as power production from a dam, are quite tangible and can be measured, any possible negative effects can be waived off as uncertain and unprovable.

37.(...continued)

Draft Supplemental Environmental Impact Statement. Washington, D.C.: GPO, pp. S-15/S-16.

38. Brunsson. 1985, *op. cit.*

Blinkered administration is exactly what happened in the United States with the Teton Dam in Idaho. A Bureau of Reclamation project, the Teton Dam was constructed in the 1970s in order to provide irrigation for crops in the sandy soils of southwestern Idaho. Despite the fact that this area, laying on the western side of the Grand Teton Mountains, recorded some of the highest rainfalls in the US (amounting to 132 inches annually, or roughly three and a half metres), congressional pressure upon BuRec prompted them to undertake a construction project to satisfy supposed irrigation needs. The cost-benefit analysis, heavily flawed in terms of both the discount rate used and the baseline data for flood protection benefits, provided a rationale for construction of the dam and focussed purely upon the positive economic effects the dam would have for the surrounding area.

The possible negative effects of the dam were fairly straightforward. Unlike the more common concerns regarding fisheries and water quality (although these were present), the US Geologic Survey (USGS) was worried about the geologic stability of the dam site. The rock upon which the dam abutments were to be built was fractured and porous, and USGS scientists began to voice concerns about the safety of the dam. Robert Curry, a geology professor at the University of Montana, described in no uncertain terms the suitability of the site. “‘It was such an obviously lousy site to a trained geologist,’ Curry added, ‘it makes you wonder what happens to human judgement inside a bureaucracy.’”(39)

The USGS sent BuRec an inter-agency memo cautioning that, although their data

39. As quoted in: Marc Reisner. 1993. *Cadillac Desert*. New York: Penguin Books, p. 404.

were incomplete, they felt it necessary to question the project on grounds of fundamental safety concerns. They needed to question the project early in its inception, while there was still a chance for reconsideration to take place. However, these comments were never passed on to BuRec in their original form, and the revised (toned-down) version was never responded to. According to Bob Curry, the nature of the decision-making process in BuRec made it so that no acceptance of negative effects would be tolerated or considered. “‘You could have told them that they were building a dam on top of an active volcano,’ he said, ‘and they would have a hundred guys out there trying to prove you wrong.’”(40)

The tragic conclusion to this example is not simply that safety concerns were ignored, or that those which existed were summarized in such a way as to lessen the impact of the statements, but that the concerns turned out to be true. In June 1976, while the reservoir for the dam was being filled, a number of leaks began along the fractured rocks abutting the dam face. The dam collapsed on June 5, forcing the evacuation of tens of thousands of residents, killing eleven, hitting four towns and cities and causing upwards of \$2 billion damage. One town, Wilford, was completely erased from the map of the state.(41) BuRec never accepted formal responsibility for the failure of the dam, and no employees were fired as a result of the incident. The agency maintained that it had used the best information available, and that it had explored alternatives to the dam early

40. *Ibid.*, p.407.

41. *Ibid.*, pp. 415-425.

in the planning process, as per the NEPA.(42)

The Teton Dam is an example of where there was no need for substantive use of scientific information as long as there appeared to be use of such information. As long as dissenting information can be covered up, alternatives limited from view, and procedures in place so information is not readily available to the public, then responsibility for such events can be hidden behind a veneer of technical competence and mechanical process. If administrative employees doubt the wisdom of their actions, or realize that they can be held responsible for negligence in the policy process, then action is less likely to occur. Information must be kept under strict control.

Of course, it may be said that the failure of Teton Dam created clear incentives for the Bureau of Reclamation to be more careful in considering alternatives, lest the tragedy and others like it seriously harm the agency's credibility. This may be partly true, but in many or most cases it is still far easier for the government to deny that it had done anything wrong, than to admit wrongdoing and make substantive changes in the administrative process. This was true (for several years, at least) even with such severe examples as the Chernobyl nuclear accident in 1986.(43) When the harm is more gradual in nature, the short-term interests of any particular agency will usually dictate that no admission of damage will be granted. To do so would be to admit that the rationale of the organization was faulty, and would create conflict with the process of *post-hoc* reasoning and justification so crucial to rational administration.

42. *Ibid.*, pp. 423-425.

43. See Grigori Medvedev. 1991. *The Truth About Chernobyl*. New York: Basic Books.

Reversing the Process

After restricting choice and imagining certainty, the third necessary ingredient for efficient action organizations is to start from the consequences of action and invent the objectives later. After all, as Majone admits, rationality in policy is little more than the ability to justify a decision after it has already been made. It is a *post-hoc* process, one in which decision need only be made to fit with preexisting beliefs and actions.⁽⁴⁴⁾ For a water management agency, this generally means that one starts with construction of a dam or irrigation project, and then works backward to provide some sort of justification and objective for the policy. Policy objectives, after all, are not as neatly defined as the traditional rational-actor model asserts. "Objectives are arguments, not criteria for choice; they are instruments of motivation and commitment, not of investigation."⁽⁴⁵⁾ In other words, inquiry to achieve an objective need only be symbolic. In the action organization, there is no substantive need to investigate alternatives needed to achieve a certain objective. This would only cause uncertainty and reduce motivations to act. Rather, the alternative will have already been chosen, and the objective simply provides a rationale for action taken to legitimate that decision. BuRec's change in objectives in the Animas-La Plata project provides a telling example of this process, where a project originally justified in terms of irrigation benefits is switched to fulfill legal obligations to Ute Indian water rights. This process will be elaborated upon in Chapter 6.

For the moment, another example may be appropriate. In documenting the

44. Majone. 1989, *op. cit.*, pp. 33-34.

45. Brunsson. 1985, *op. cit.*, p. 25.

changing history of the Orme Dam in Arizona, Wendy Nelson Espeland described how the dam's justification and supposed objectives were constantly changed in order to accommodate changing political winds. Conceived as part of the massive Central Arizona Project (CAP), the Orme Dam was originally designed to store and regulate flows originating from the Verde and Salt Rivers. This water could then be used locally, as a supplement to waters drawn from the nearby Colorado.⁽⁴⁶⁾ In general, BuRec saw this as little more than an empty dam site to be filled. Its role as part of the CAP was undeveloped, so the original motivation was drawn from the institutional ideology developed over the years by the dam industry in the western US. ⁽⁴⁷⁾ In describing the original justification for the project in the 1940s, Espeland quotes one of the project's engineers as saying,

“At that stage, Orme does nothing in relation to the rest of the project; it just augmented water supply. It was just an add-on to the other project. One of the concepts we worked on in the forties was the idea of the continuing damming of the West. This was still a goal, a way of thinking. There were still increments that were undeveloped. We were still filling in the gaps. It wasn't a question of whether or not this was the best element. It was a good dam site that was empty, so you put a dam there.”⁽⁴⁸⁾

Such an explanation, however, would hardly work to publicly justify a multi-million dollar project against any opposition. If anything, CAP was justified in terms of

46. The Animas-La Plata project was also conceived at the same time as the Central Arizona Project.

47. Wendy Nelson Espeland. 1998. *The Struggle for Water*. Chicago: University of Chicago Press, pp. 108-112.

48. *Ibid.*, p. 111.

saving local economies and keeping the desert from encroaching upon agricultural lands. No alternatives to the plan were given, and no negative effects were mentioned. Only positive benefits were given a place in the original 1947 authorization report, such as flood control, salinity control, recreation, fish and wildlife preservation. No mention was made of forced relocation of Indian tribes, environmental damage, or loss of stream flow downriver. Even though this omission could be partly explained in reference to the early date at which the report was written, Espeland argues that this would not explain all discrepancies, and more importantly, this explanation does not address why this report remained the only one used through the project's authorization process in the late 1960s.(49)

The passage of the NEPA in 1969 forced BuRec to draw up an environmental impact statement for the Orme Dam, but this changed little in terms of BuRec's determination to build the dam. True to the 'action organization', no realistic alternatives were given to construction, and those which were presented were portrayed in such a way as to only reinforce the belief that Orme was a desirable project.(50) The justification for Orme changed, however, as opposition to the dam grew and became more organized. Supporters of the dam began to view Orme as symbolic of the entire CAP, and saw the completion of the Orme Dam as integral to the justification for CAP, itself. That is, Orme was a way for Arizona to keep water out of California, where rights of water usage would prevent any further expansion of water development (and hence, economic development)

49. *Ibid.*, p. 111-112.

50. *Ibid.*, pp. 114-116.

in Arizona. Orme also became symbolic for an entire dam industry which was under fire from Washington and from environmental groups, whose increasing lack of good dam sites and failures like Teton Dam only worsened matters.

The final fate of Orme, when Interior Secretary James Watt cancelled the project in the early 1980s, was a result of the inability of BuRec to control the nature of justification for the project.⁽⁵¹⁾ By forcing BuRec to reevaluate its objectives, and by forcing new ones upon the agency, justification and motivation to continue the project withered away. In effect, the NEPA process, by forcing (or simply allowing?) a more open and scientific process of evidential evaluation, created too much doubt and uncertainty for action to take place. All three ingredients of Brunsson's action organizations were made problematic by the introduction of the NEPA in the United States, a process which will be encountered again in Chapter 6.

Science, Information, and Administrative Uncertainty

Evaluating Science in Administration

The previous section provided examples of how administration may cause problems in using science, but does not fully explain why such processes should generally be the case. After all, the Animas-La Plata, Teton, and Orme dams may all be isolated cases, easily focussed upon but not indicative of a general trend. Just because it may make sense for an organization to arrange things in certain ways that accord with

51. *Ibid.*, pp. 135-182.

Brunsson's views, does not mean that they actually will. For this reason, this section elaborates upon these critiques, showing how the need to reduce uncertainty in an administrative hierarchy does indicate a more general tendency to false reasoning and rejection of science.

Structures of modern institutions are based upon past actions and ways of thinking which reflect the values of Crosby's 'New Model'. Many of these ways of thinking are vital to support the third brand of instrumental politics, both for internal and external consistency. Yet many of the ways in which these beliefs have manifested over the years are much more symbolic than substantive. The process of defining problems in terms of technical solutions, the belief in scientism and direct application of science to social issues, and the ideals of social engineering are not necessarily anti-scientific. In many cases, the people who profess such beliefs may earnestly trust in the ability of science to achieve what they have set out to do. But this does not mean that what they end up with is scientific. Recall from Chapter 2 that technicism is not the same as science, and in many cases poses a direct threat to scientific reasoning and research. Scientism and naturalistic fallacies are useful to administrative institutions in adhering to the instrumental vision, but they are not healthy for science.

So why the illusion? Are the examples presented before simply cases of deliberate fraud, conspiracy theories where information is hidden from unsuspecting citizens? The short answer is both yes and no. Yes, there will be some degree of deliberate chicanery and spin-doctoring, but one need not assume such conscious action in order to prove fraud, at least in a systemic sense of the term (as opposed to legal definitions). Rather, the

way in which institutions are formed limits thought in certain ways, and organizations working within that institutional environment can limit this spectrum of thought even further. The patterns of information processing in administration attempt to limit information so that action can take place, working upon assumptions of relevance and scope which may well not be shared by those outside that environment. As Espeland notes with regard to the Orme dam and BuRec, accusations of blatant bias are difficult at times.

As the early Orme documents suggest, there were times when the agency came close to cooking the numbers, but often bias was subtler and less strategic than that. Within the worldview of the participants, they were not systematically excluding damning information, or inflating benefits, or minimizing costs; they were making sound decisions on the basis of the kinds of information they possessed or routinely collected. And making sound decisions hinged on deciding where and what kind of dam to build. The engineering ethos informing their planning was so taken-for-granted, so deeply implicated in how they understood their jobs, it prevented them from even noticing what others would see as blatant bias.(52)

The administrative processes create systemic biases which facilitate against proper scientific research methods. This is not simply a matter of institutional norms being incommensurable with other sets of contextual values. If the values in question were the only bases upon which decisions were made, then any sort of relativistic approach could and perhaps should be warranted. But if science is invoked in the process, if the authority of science is used to create goal displacement and cover over thorny ethical issues, then charges of bias need to be taken much more seriously. Bias can emerge as the result of

52. Espeland. 1998, *op. cit.*, p. 124.

either collective individual actions, or as the result of institutional operating norms.

Through the certain use of procedures in language and problem identification, administrative organizations can create environments in which false reasoning becomes the norm.

Administrators and the Simple Task

The internal workings of institutional environments is one in which the belief in instrumental action precludes certain forms of action while mandating others. If the world is governed by certain immutable laws, then the job of the administrator is to find the simplest solution to the problem at hand. Simplifying also involves identifying the problem so as to fit with possible solutions, which results in the technical and problem-solving nature of so many environmental policies. In short, however, the immediate goal of an administrator is to keep the matter as simple as possible, with as little uncertainty as possible. Only if an answer is clear and unambiguous can action be taken and rationalized in a manner acceptable to citizens with external expectations for instrumental action. Weber knew well that this is in many ways the strength of administration, for it allows parts of an organization to focus on only one segment of a problem, rather than acting as individuals burdened by full information.

Administrators draw upon the institutional understandings of past actions and ways of thought to create simplified cognitive maps of the world. As Herbert Simon wrote, this is because the administrator,

“... believes that the real world is mostly empty, that most of the facts of the real world have no great relevance to the particular situation he is facing and that most significant claims of causes and consequences are short and simple.”(53)

Faced with such an understanding of the world, it is difficult for those in administrative institutions to take new evidence seriously, to be able to place it into their preexisting concepts of simple cause and effect. As well, the needs of action organizations dictate that conclusions come first, evidence comes later. And any evidence produced which contradicts such conclusions must be played down, silenced, or ignored.

Administrative Language and Concept Reinforcement

The particular use of administrative language and concepts, the role of uncertainty absorption, and the nature of modern politics as an isolated engineering enterprise all contribute to the endemic false reasoning and anti-science of public administration. Administrative language is built up for the purpose of effective communication within an organization. It provides discrete categories of understanding for larger concepts which may otherwise prove hazy, and so reduces the need of the administrator to make choices other than the simple categorization of otherwise unique events and individuals. Things falling under such classification schemes are thus understood purely in those terms: either tall or short, thin or fat, black or white, large or small, positive or negative, ignoring all unique qualities of the object(s) under consideration. The practice developed according to the premise that rules and regulations should be applied equally, without regard to

53. As quoted in : Torgerson. 1990b, *op. cit.*, p. 25.

circumstances or the particular conditions under which one may fall. The process serves to homogenize people otherwise composed of distinct groups or individuals, and by categorizing them in ways which fit the understanding of the state, exert a form of control over them.

These categories provide a basis for understanding the world from the view of the administrator. Water management agencies typically see landscapes in regard to their potential for water development, power production, or flood control. They assess the pros and cons of a proposed project in terms of benefits to all manner of the economy and environment, while limiting negative benefits to those monetary resources necessary to get the project completed (or, more commonly, just enough to win authorization).

Arguments which fall outside of these categories tend to be ignored, or written off as extraneous to the matter at hand. As long as technical vocabulary and classifications are a way of communicating problems within an organization, they will serve a purpose in providing efficient 'short-hand' in identifying both problems and their solutions. These forms of classification have much to do with both the larger institutional atmosphere within which an organization operates, as well as the more immediate tasks which the organization is expected to undertake. As with the Orme or Teton dams, BuRec simply saw opportunities to build dams, and the justifications for such structures were developed along the lines of BuRec's organizational ethos: water supply for the western United States.

Mentally 'Filing Away' Information

Classification schemes become more than simply short-hand within an organization, though. They serve to block out competing conceptions and interpretations, and become reified through their use. This process of reinforcement makes the categories seem much more real, "...and become, for members of the organization, attributes of the world rather than mere conventions."(54) In other words, contextual values regarding how the world is seen and which areas are the most important for consideration, become constitutive values regarding how problems are to be worked out and which methodologies are to be used. This greatly simplifies the role of inquiry, because it reduces inquiry to a reassuring process of supporting hypotheses which were never meant to be questioned. Any measure of doubt is meant to be weeded out from the system, for doubt only paralyses action by creating (or admitting) uncertainty.(55)

Essentially, any information which reaches the administrator has to be dealt with so as to reduce this uncertainty. That is, either it must be placed within one of the pre-defined categories used to describe the world to that organization, or it is deemed to be irrelevant. As Christopher Hood wrote in regard to this process, "...incoming stimuli either fit into rigid preconceived categories or else do not exist."(56) If information is presented to a water management agency regarding the environmental damage which

54. March and Simon. 1958. *op. cit.*, pp. 164-165.

55. Charles S. Peirce. 1957. *Charles S. Peirce: Essays in the Philosophy of Science*. Tomas (ed.), New York: Liberal Arts Press, p. 201.

56. Christopher Hood. 1976. *The Limits of Administration*. London: John Wiley and Sons, p. 63.

would exist as the result of a dam project, the organization may well be unable to digest that information. They are unable to use it in such a way as to make any difference to the conclusions they may have reached that the dam was a desirable project. If all past actions have been taken to build dams, if this is seen as a desirable goal and one which was for some time given wide public support, then all information will be used in such a way as to focus upon the positive aspects of the project.

Those who dissent may be labelled as 'extremists' and written off as having nothing valuable to contribute. This is particularly true if traditions within the institution of water management hold that questions of policy should be answered in terms of technical questions. The naturalistic fallacies used by an organization such as BuRec, that uses tools such as cost-benefit analysis to avoid taking responsibility for serious ethical and political questions, offers a prime example of how information processing can be used in goal displacement. As with Brunsson's second condition (suppressing conflicting information), no one can be held responsible for information they did not possess.

Thus, administrative language constrains the world within which administrators live. A dam either produces money or it does not. The notion that it may produce hydroelectric power but be environmentally unacceptable is a difficult concept to accept, because there are no rules governing how to conceive of such a problem. Either the solution must be imposed from without (by judicial or executive action, most likely), or the concepts must be stripped of their original meaning in order to fit with the institutional rules. In the case of environmental damage, this has been attempted by quantifying environmental damage in terms of monetary amounts. In other delicate subjects, such as

the displacement of (generally native or aboriginal) people from a proposed dam site, compensation packages are deemed acceptable by the state and then figured into the cost-benefit analysis. Attempts to work around these ways of seeing things are difficult, and form the basis for much of Espeland's work on water management projects, such as the Orme dam. She argues, for example, that the introduction of the NEPA in the US did not result in the increased use of qualitative analysis in environmentally-related issues, but rather sparked an immense surge of research into quantifying previously unquantifiable subjects.(57)

'Knowledge Brokers'

In part, this attempt to reduce all new information into preconceived categories of understanding is a process of uncertainty absorption. Whenever information is gathered, modified, and passed along with administration, attempts are made to reduce the inherent uncertainty surrounding that information. Keep in mind that information within an organization is expected to be kept as safe and certain as possible, for it should not cause any cognitive dissonance or doubt as to the correctness of actions. Information is gathered prior to making decisions, not to adhere to any substantive rationality regarding consideration of all possible alternatives, but as a symbolic gesture to the institutions which creates expectations that such action will take place. The process of information gathering is thus symbolic, and is not meant to settle doubt by the introduction of

57. Wendy Espeland. 1994. "Legally Mediated Identity: The National Environmental Policy Act and the Bureaucratic Construction of Interests." *Law & Society Review*. 28, 5, pp. 1155-1156.

irrefutable evidence.(58) Quite the contrary, uncondensed environmental reports could create much more uncertainty than they would possible solve for an organization, save in answering specific and non-normative questions.(59)

The process of uncertainty absorption continues beyond introducing new information to the organization. Information which is passed long inside the organization changes as it moves. Conclusions are reached according to the organizational environment and institutional ideologies present, and are reinforced by individual selective perception. These conclusions are then passed along in a form altered from the original. Essentially, the information is transformed into a format and language more suitable for that particular environment, and with particular parts of the data set either excluded or played down according to its assumed relevance to the process.

In organizational communication evidence is replaced with conclusions drawn from that evidence, and these conclusions then become the 'facts' on which the rest of the organization acts.(60)

As long as information is constantly edited and reinterpreted as it is passed along inside an organization, it becomes more and more difficult to assess the validity of the evidence on anything other than trusting the word of whoever last possessed the data.

58. Martha Feldman and James March. 1990. "Information in organizations as signal and symbol", in: *Decisions and Organizations*. March (ed.), Oxford: Blackwell, pp. 409-428.

59. Unless the researchers included such normative notions in their research methods. See Shrader-Frechette and McCoy. 1993, *op. cit.*; Sarewitz. 1996, *op. cit.*

60. March and Simon. 1958, *op. cit.*, p. 155.

Interpretation is a form of political power which can be exerted by those lower in the process, and is quite similar to the notion of 'knowledge brokers' used by Karen Litfin.⁽⁶¹⁾ Interpretation must be based upon the last form given to the person in question, and any interpretation of that evidence must be based upon the known biases to which the source was subject. Direct examination of the evidence is either not possible or it is not desirable.⁽⁶²⁾ Distortion from the original is quite possible, and is likely all the more if the concepts under scrutiny are complex and unsuitable using the organization's administrative language. Translation into a format suitable for decision-makers can turn information into something it was not before, and allows one to arrive at conclusions which may not have been present earlier. But this is not simply a matter of allowing alternative interpretation from the original.

Scientific evidence generally contains enough uncertainties to allow for a number of alternative explanations, especially in the ecological sciences. What is of more concern is that the administrative knowledge-brokers tailor conclusions in only one direction, one which is consonant with the institutional ideologies present. Moreover, the ability to contest those 'facts' becomes quite difficult as the original source of data is lost.

The 'facts' he communicates can be disbelieved, but they can only rarely be checked. Hence, by the very nature of limits of the communication system, a great deal of discretion and influence is exercised by those persons who are in direct contact with some part of the 'reality' that is of concern to the organization... In a culture where direct contradiction of assertions of fact is not approved, an individual who is willing to make assertions, particularly about matters that do not

61. Litfin. 1994, *op. cit.*

62. March and Simon. 1958, *op. cit.*, p. 165.

contradict the direct perceptions of others, can frequently get those assertions accepted as premises of decision.(63)

This process can often invert hierarchies in an organization, so that those in lower positions exert control over their superiors. By the skilful withholding of information, particularly conditional stipulations so often necessary in scientific research, policy decisions can be made much more rational (that is, persuasive) and more difficult to contest.(64) Withholding of information and the drawing of conclusions without disclosure of underlying data is of particular concern in the sciences, where public and administrative expectation of certainty creates an impetus to present evidence in such an altered form.(65) Such a process is, in effect, an institutional bias which is compounded by organizational biases.

Scientism and the Institutional Ideology of Certainty

Institutions and social artifacts reinforce the belief that science should provide certain answers to policy questions. These are the public and private beliefs in scientism and naturalistic fallacies supported by the 'New Model'. Such institutional ideologies are then internalized in organizations, which take their particular goals and transform the scientific data in such a way that it comes to resemble what the institution expects, as

63. *Ibid.*, p. 165-166.

64. Michael Thompson and Aaron Wildavsky. 1986. "A Cultural Theory of Information Bias in Organizations." *Journal of Management Studies*. 23, 3, p. 274.

65. Susan Watts. 1990. "Science advice: an abuser's guide." *New Scientist*. 125, 1707, pp. 55-59.

well as being supportive of the particular organization's goals. The usual compendium of uncertainties which accompany scientific research efforts are discarded in the process, and are replaced by the contextual values of the researchers and/or administrators. In this way, policy is made both rational and efficient. It can be made persuasive to a reasonable audience, which is Majone's definition of a rational argument, and can be implemented without attending doubts regarding possible alternatives or consequences.(66)

An alternative process available to policy-makers or administrators is to focus upon uncertainty. Rather than playing down the role of scientific uncertainty in attempting to accomplish a goal, it is often possible to highlight such uncertainty, instead. The difference between approaches normally lay in whether the goal is a positive or negative one, not in evaluative terms, but whether the goal calls for action or the lack of it. A policy may well be established by the conscious effort not to do something. In such a case, the justification for non-action can be established in reference to a lack of full information, claiming that action may only be taken once complete and reliable information exists as to the consequences of an action. In practice, this could justify almost any attempt at non-action in environmental affairs, yet its persuasive capacity seems to have not diminished greatly.(67) Whether this is a political tactic or genuine concern depends upon one's perspective. A decision to postpone construction of a dam pending review of the dam's impact on certain wildlife may well be interpreted as good environmental policy by those forcing or calling for a postponement, while viewed as

66. Majone. 1989, *op. cit.*, p. 34.

67. See the examples given in Robison. 1994, *op. cit.*

political meddling and 'bad' science by dam proponents.(68)

A more overt process of uncertainty highlighting can take place when an organization focuses upon the skeptics in the process, meaning those who challenge any general scientific consensus on an environmental issue. Such tactics have been favoured by the US Congress in attempting to repeal CFC, dioxin, and global warming related issues. Although such an approach generally is justified on grounds that science should not be judged by political means, the role of highlighting uncertainty in order to justify non-action is itself political.(69) Ironically, by focussing upon the failings of science to accurately predict environmental processes, such policy-makers rely upon positivist beliefs in just such an ability.

A final process by which science can be used to control administrative agencies is to create forced or mandated uncertainty. By withholding all information necessary to enforce laws or regulations, an agency is bereft of its legitimating source of instrumentalism.(70) It may be able to take actions, but with a public seal on the requisite information, it effectively hampers efforts by the agency to complete its intended goals. Ironically, agencies which rely upon the symbolic use of information to carry out its goals may also be hampered by symbolic restrictions on such information. Whoever controls

68. Efforts by the US Fish and Wildlife Service to postpone construction of the Animas-La Plata project followed a similar pattern.

69. George E. Brown. 1997 "Environmental science under siege in the US Congress." *Environment*. 39, 2, pp. 12-20.

70. For example : Juliet Eilperin. 2000. "House Votes to Restrict EPA Use of Smog Data." *Washington Post*. 22 June 2000, p. A01.

the symbols controls the politics; this is generally done with indifference to the reality of the situation. But such acts rely upon the myth and vision that politics is subordinate to science and reason, that only one answer exists.

Environmental politics and environmental sciences do not mesh well with such a vision. There are no clear boundaries in environmental issues, there are no clear ways to determine that one action is sufficient to solve a problem, and that it will not simply cause yet another. The environment is anything but simple and homogenous, easily read and just as easily managed by administration.⁽⁷¹⁾ If the administrative state is detrimental to the aims and processes of environmental politics, then why should one assume any differently when it comes to environmental sciences? The basic traditions of the administrative state do not foster an atmosphere within which science can operate without difficulty.

From Administrative Process to False Reasoning

Why is Administration Special?

These processes of information control by administrative authorities heavily contribute to an atmosphere of false reasoning in politics. The attempt to control all information under a single authority, to be able to impose one perspective upon the world and directly apply such knowledge to policy, results in the denigration of scientific

71. John S. Dryzek. 1990. "Designs for Environmental Discourse: the Greening of the Administrative State?" in: *Managing Leviathan*. Paehlke and Torgerson (eds.) Peterborough, ONT: Broadview Press, pp. 97-111.

research. That this process of delegitimation occurs in the name of science is both perplexing and deeply ironic. But all the pitfalls of science described in Chapter 2 are present in administrative politics. Organizations that deal with environmental problems encounter grave difficulties if they attempt to define such problems in any way other than technical issues requiring technical solutions. The legitimacy of the process in administration has often failed to take democracy into account, so that it is difficult to conceptualize problems in a more socially open manner.(72)

In other words, administration has lost touch with the instrumental vision which formed the basis for its legitimation. By relying upon a symbolic set of actions where information gathering and inquiry are concerned, and by relying upon notions of proprietary secrets in those organizations, administration has set itself in a difficult situation. The realization that public administration is not compatible with notions of democratic rule has become obvious to many, and the general effects of technical goal displacement have been to promote mistrust and suspicion of such political entities.(73)

In some cases, the disjuncture between state pronouncements and scientific research have become so apparent as to undermine the entire legitimacy of the state. A reliance upon the legitimacy of instrumental action works only so long as people believe in such a vision. Should people perceive a considerable lack of either use of science or ability to invoke oversight, the legitimacy is likely to fail. The rise of the environmental

72. Douglas Torgerson. 1990a. "Limits of the Administrative Mind: The Problem of Defining Environmental Problems", in : *Managing Leviathan*. Paehlke and Torgerson (eds.) Peterborough, ONT: Broadview Press, pp. 115-164.

73. See Harmon. 1990, *op. cit.*

movement in Hungary, which was itself a key factor in the 1989-1990 transformation in government, was in large part motivated by just such frustration on the part of scientists and academics. In other cases, the loss of legitimacy resulted in new legislation regarding decision-making and the use of inquiry, meant to overcome the problems of secrecy, lack of oversight, and goal displacement. This was the case in the United States and Norway with the adoption of laws relating to environmental assessment, although their respective successes in achieving those goals has varied to a considerable degree.

As explained in the previous chapter, science requires that conclusions be questioned, that nothing should remain simply assumed. One cannot begin with the conclusion and then work backward, contorting evidence and explaining away all contrary arguments. All evidence within the scope of inquiry must be given consideration, and the scope itself must not be overly narrow so as to preclude confounding variables. This is more true for policy than it is for science alone. Unlike laboratory science, "The practitioner can never choose to disregard conditioning facts or consequences simply because they fall outside the scope of his theory."(74)

And when it comes to alternative explanations, they cannot simply be discarded because of inconvenience. Again, these are ideals in terms of inquiry, but they form much of the basis to which the scientific community aspires. Traditional administration appears to do the opposite. By reducing alternatives of choice, suppressing or silencing undesirable criticism, and by beginning with conclusions and marshalling the necessary arguments only afterwards, 'rational' and 'efficient' administrative organizations work

74. Herbert Simon. 1976. *Administrative Behavior*. New York: Free Press, p. 70.

contrary to the values and goals of scientific inquiry. Organizational outcomes must often come at the expense of honesty, even if unintentionally. As Charles Peirce commented in regard to discounting doubt in achieving goals,

The effect of mixing speculative inquiry with questions of conduct results finally in a sort of half make-believe reasoning which deceives itself in regard to its real character.(75)

75. Peirce. 1957. *op. cit.*, p. 201.

Part Two

The Intersection of Science and Policymaking

From Theory to Context: Water Management in Europe and the US

It is not enough simply to claim that certain processes of administrative agencies can occur in theory. The issues of goal displacement, uncertainty absorption, post-facto justification and overall technicism can easily be spoken of in generalities, but it is important to make clear the connection between these theoretical concerns and real-world examples. To this end, the second part of this thesis will focus upon three cases of how science, research and knowledge have been abused in the policy process. Although these cases are quite unique in their histories and in terms of the states in which they are located, the case study chapters that follow will focus upon three major processes covered in the earlier theoretical section. By exhibiting the similarities encountered within these processes, one can see how the over-arching ideals of technicism and 'High Modernism' have pervaded modern, industrial states of the West.(1)

As addressed in earlier chapters, the ideals of technicism have so permeated the modern state that policy processes often proceed upon the premise that simple means-ends actions can be carried out. Rather than administration acting as an organic process, policymakers believe that technical experts have the ability to divine the public good and future outcomes with absolute certainty, and that a linear relationship exists between

1. One of the best recent histories of such beliefs can be found in: James C. Scott. 1999. *Seeing Like a State*. New Haven: Yale University Press.

actions and outcomes. The inability to acknowledge the shortcomings of such beliefs only further attests to the power of the instrumental model and the perhaps desperate desire for legitimation on the part of administrators. The appearance of science provides just such a legitimating force.

The background for employing science in policy rests not only on the belief in perfect knowledge and its clear application to social issues, but also a latent need to evade responsibility and accountability. This evasion of accountability is the essence of goal displacement, and will be one of the overriding problems discussed in the case studies. By framing political questions in scientific or technical terms, policymakers can avoid questions of responsibility for actions, as well as being able in many cases to act in ways that counter what citizens themselves desire. Not all actions that fall under the category of goal displacement may be intentional, but they are nonetheless an effective way for administrative agencies to extend or maintain power in the face of conflicting values.

The belief in the absolute certainty of technical/scientific knowledge to predict outcomes and forge policy also leads to the second problem focussed upon in the case studies: uncertainty absorption, or forced certainty. Again, uncertainty absorption is a process which may well not be intentional, but it reinforces the belief in technicism by selectively ignoring or interpreting information. Information stripped of all conflicting data and uncertainty may make those in administration strive for more certainty, rather than try to deal with large amounts of contradictory information. The desire for certainty is a self-reinforcing cycle, for researchers will often tailor reports to fit the desire for greater certainty, resulting in important caveats and vital reservations of the research

being left ignored.

The third major focus will be upon the post-facto justification of policies. By marshalling and manipulating evidence so as to fit a pre-determined outcome, administration in essence also pre-determines the conclusions of research. Pre-determining outcomes is necessary because the resolution of the policy (i.e. the building of the dam) is never meant to be in question, even when new or existing information surfaces which may well contradict earlier beliefs. The justifications and evidence may change to fit political expediency, but in a pattern that suggests the policy was never wrong in pursuing a certain outcome.

Examination of these three major problems places emphasis not only on the relationship between science and politics, but helps to show that the two are inseparable concepts. Science and administration cannot and should not be perceived as theoretically distinct entities, that politics is some outside force acting *upon* science. Rather, the necessary existence of social values *within* scientific endeavours means that science is susceptible to human and political frailty. Contextual values of politics are often more powerful than the methodological values of research, to the point where it is no longer useful to refer to something as 'scientific research'.

It should be kept in mind that the existence of problems in using science in environmental policy does not imply that science plays no positive role. On the contrary, it remains an important tool for policymakers, administrators and citizens. Yet science is just that- a tool. Science is a collection of critical methodologies, not a means to an end. It cannot replace the necessary political decisions surrounding any policy, nor the

responsibility attendant any such decisions. Science cannot be carried out in secrecy and still provide a legitimating force in politics, for it is a fallacy to state that science operates outside of, and independently from, important social values. Attempts to maintain secrecy or control may only result in greater political conflict, as the connection between administrative arguments and reality becomes visible. The following chapters provide examples of where just such rifts have occurred, between scientific research and the goals science was supposedly enlisted to support.

Methodology and Choice of Case Studies

This work now turns to the case studies in the Hungary, Norway and the United States, three industrialized countries whose experiences in handling scientific information are remarkably similar, despite seemingly large differences in the respective governments. By focussing upon similar water management projects in different countries, many of the theoretical concepts raised in this chapter may be applied to more concrete examples. Application does not imply that the theoretical precepts developed in these first three chapters will be proven, but they can be instructive as to future actions to improve the difficulties so far identified.

The second half of this research thus relies upon a form of research distinct from quantitative or qualitative methods, neither of which would have been entirely appropriate for answering the 'how' and 'why' questions of administrative misuse of science. A quantitative model would have been extremely difficult to construct, particularly for historical examples and in different countries. Not only would have

identification of variables been challenging, but considering the difficult nature of defining concepts like 'science' into even one language, translation matters alone would have put the validity of such measures into serious question.

Case studies are also distinct from qualitative methodologies, even though they have often been identified as essentially similar. Qualitative research, such as many anthropological approaches, uses detailed and direct observation, and employs the attempt to avoid prior commitment to particular theoretical models.⁽²⁾ These cases, by contrast, have already laid out a theoretical model, and direct observation of events in these studies was simply not possible (they are, after all, historical).

It should be noted that these three cases were originally exploratory in nature, and only later could be refined into explanatory cases. They provided much of the direction for the material contained in Chapter 1-3, and corrected many of the errors with which I had started this research. The use of three studies benefits not only from the breadth of experience and empirical evidence, but the ability to cross-check concepts and hypotheses. Since multiple studies rely upon a repetition rather than a sampling logic, they should be corroborated as single experiments, rather than approaching them as three within-experiment designs. In other words, differences are anticipated between the cases, and the existence of such contrasts does not nullify the overall arguments. If they can be explained adequately, contrasting experiences can actually strengthen the conclusions.⁽³⁾

2. See Robert Yin. 1994. *Case Study Research: Design and Methods*. Thousand Oaks: Sage Publications, pp. 13-14.

3. *Ibid.*, pp. 45-46.

Hungary, Norway and the US were chosen as case studies for a number of reasons, the first of which was a desire to restrict study of cases to modern, industrial states. Large development projects may well have a different dynamic in lesser industrialized countries, most notably due to the immense outside influence of development agencies and multi-national corporations.⁽⁴⁾ The states themselves do not control many of the crucial operations, and because of this it is difficult to properly focus upon public administration in such environments. In addition, by providing countries with significant common variables in terms of education, infrastructure and scientific expertise, differences could be more easily identified and explained. Were the case studies too dissimilar, it would be difficult to argue that the determining administrative processes worked in the same manner in different states.

At the same time that similarities are a necessity for study, these three countries represent variations within industrialized countries, both in their political systems and the legitimizing principles underlying those systems. Hungary, a communist system during the period of study and until shortly after the dam construction was cancelled, represents a system based upon a very technocratic legitimation. The state ideologies present in many of the Soviet-influenced countries claimed that technocratic elites could act on behalf of citizens, very close to the third form of legitimation described earlier by Ezrahi. There was no need for public participation or for the public to have access to information. Any such actions would only be seen as interference by non-objective non-participants.

4. Not coincidentally, several of the world's largest dam construction companies are based in either North America or Scandinavia.

Because of the very closed nature of the system, one might perhaps expect the grossest abuses of science in such a state, despite claims to scientific legitimation from communist leaders.

Norway, as a social democracy, is perhaps best expressed as Ezrahi's third form of legitimation, albeit with an underlying political system resting upon notions of popular sovereignty and egalitarianism. Under a weak socialist system, a country like Norway would claim that the best decisions are still made by technical experts working within an administrative capacity, provided that citizens are given full access to information. Public administration would have, it might be assumed, slightly less capacity to abuse science with public oversight present, and less ability to force decisions upon an unwilling populace.

The United States is perhaps the best example available for a country representing Ezrahi's second form of legitimation (that of a Jeffersonian, representative democracy), with definite leanings toward the more free market, individualist legitimation described as Ezrahi's first form.⁽⁵⁾ The United States provides an interesting mix of ideas and processes, for while it adheres to the ideologies of representative democracy, it relies (perhaps from necessity) upon the use of administrative agencies and their technical expertise. It is little accident that the study of public administration first grew in the US

5. This first form of legitimation stemmed from the idea (as with Adam Smith) that the collective choices of individuals would benefit the community, as a whole. The second form was slightly different, claiming that the community would follow the 'light of reason' and that they would act according to this rationality (as opposed to self-interest). See Yaron Ezrahi. 1990. *The Descent of Icarus: Science and the Transformation of Contemporary Democracy*. Cambridge, MA: Harvard University Press.

and contended that administration only existed to implement the policy decisions of elected officials. As misleading as such an argument is, it reflects deep ambivalence toward the idea of allowing unelected experts to make decisions on behalf of others, and this mistrust is exemplified by the numerous pieces of legislation enacted to prevent abuse of information and research in government.(6)

Despite the appearances of one system being more prone to abuse than another, what is interesting are the similar ways in which the processes of goal displacement, scientific mimicry and abuse of scientific research play out in these countries. Even though Hungary was the only one of three states to have official censorship, the other two maintained repeated efforts to control information flows in quite similar ways. And despite the differing ways in which the political systems were legitimated, all exhibited the apparent desire to control the outcome of scientific research in order to match the goals of particular groups or individuals.

The projects within the countries were chosen for their relatively recent nature, and as dam construction projects have become much less frequent since the 1970s, this significantly narrowed the range of possibilities. The Alta project in Norway and the Bős-Nagymaros in Hungary were both extremely visible debates within the respective countries, and the Animas-La Plata project was highly debated within the US and particularly Colorado and New Mexico. The specifics of the projects were very different, yet the rough size (in terms of both funding and environmental impacts) of all three were

6. Examples include the Administrative Procedures Act (APA), National Environmental Policy Act (NEPA) and the Freedom of Information Act (FOIA)

similar.

The three case studies are also similar in that they were legitimated on the basis of certain scientific or technical information, or at least the appearance of such. The use of such knowledge came in two forms: information presented to justify the necessity or a project, and knowledge to argue that negative effects would not appear or would not outweigh the benefits. It is important to make this clear from the outset, that had the cases been argued on the basis of admittedly political merits or values (e.g., building a dam in Colorado is desirable for winning votes from constituents and continuing the administrative power of the Bureau of Reclamation), then they would not have qualified as suitable cases. Instead, however, the case studies were argued on the basis of information which served to mask such political values and motives.

Construction of the dams described in Chapters 4-6 were purportedly justified purely on the basis of energy forecasts and cost-benefit analyses, and supported by the lack of negative evidence from environmental assessments of biologists, geologists, ecologists and the like. These studies were often found to be fraudulent, however, and direct errors of omission, manipulation of data and poor data communication were often politically motivated. These cases therefore serve to show that transparency in matters involving science is the best course of action, for science and politics cannot be separated, and it is wise not to believe that science can supplant political decisions.

These three countries and their respective projects produce a richness of context

that would otherwise be unavailable by focussing on only one case study.⁽⁷⁾ The case studies provide examples of similar outcomes despite different conditions and histories, and differences that were perhaps (save for the sudden collapse of communism in Eastern Europe) predictable. Overall, they show how administration routinely attempts to control information in ways that counter the necessary conditions for scientific research, and that only diverse control over both the political process and science can produce conditions amenable to both legitimate government and science.

7. By 'richness of context' I refer to the existence of more variables than data points, and the necessity of employing multiple methodologies or sources of data. This was another reason why quantitative or qualitative methodologies alone would not have sufficed. See Robert Yin. 1993. *Applications of Case Study Research*. Newbury Park: Sage Publications, pp. 3-11.

Chapter Four

Hungary, Bős-Nagymaros and the problem of administration

Fraud is the homage that force pays to reason.

-Charles Curtis

The Bős-Nagymaros dam project provides an excellent example of how administrative politics can interfere with environmental sciences, and how the processes of administrative false reasoning explained in Chapter 3 work in practice.⁽¹⁾ Drawing upon the instrumental vision of politics, the dams project along the Danube attempted to silence any critics by presenting the proposed barrage system in irrefutable, technical terms. The resulting process of politics over the lifetime of the project accurately matches those explained in earlier chapters, where the attempt to create a technical, scientific rationale for political action serves much more to silence critics than to promote science. On the contrary, scientists working in related areas were often those most concerned with the project's justification, while at the same time being some of those least able to officially voice their objections and concerns.

Hungary is an interesting case because the Bős-Nagymaros project became

1. Bős is the Hungarian name for one area of the project, which in other writings is often referred to by its Slovakian name of Gabčíkovo.

symbolic for much of what was wrong with politics in Hungary. Rather than science being able to solve political issues, the political issues were largely unable to use science. The application of knowledge (other than structural engineering, perhaps) created effects which the government was unable to control, for debate over the dam's effects illustrated that not only had the Hungarian government been dishonest, but that much of its claim to legitimation was no longer solvent. While admitting that larger events in the 1980s played the crucial role in the breakdown of communist authority in Hungary, the dam project was set up in a way that exemplified all that was wrong with the state and its administration. By relying upon policies whose real motives lay hidden behind a veneer of technical arguments, while not adhering to scientific prescriptions of methodology, the communist government in Hungary effectively set itself up for discontent and suspicion. The Bős-Nagymaros project simply provided one of the most visible manifestations of such a process, and one of the easiest avenues for expressing grievances. It ultimately became the litmus test which the Hungarian communist government was to fail in 1990.

This case study will look into the details of the Bős-Nagymaros project from the perspective of the Hungary, and employ the concepts laid out in the earlier chapters to show how science is misused and misrepresented in the administrative process. This dam project has received widespread attention in the world press for its World Court case with Slovakia, and disputes between the two countries continue to this day. It should be emphasized from the outset, however, that the primary focus of the this work will fall upon Hungary, and administrative decisions made within that state prior to the fall of the communist government. Such limitation is not done to diminish the outside influences of

countries such as the Soviet Union, Czechoslovakia, and Austria, but rather so that the specific administrative processes of one state can be examined.

Despite the large documentation which exists on the project (mostly due to the World Court case), most of the relevant documents concerning the time period in question were not available. This made researching the case more difficult than with Norway or the United States, as all document trails from government agencies were either lost, destroyed or stolen following the change of government in 1990. Several officials with whom I spoke admitted that archival research was not directly possible. For this reason, the case study presented here relied upon personal accounts from those prominent in the environmental and scientific establishments at the time, and largely by scientific reports published on the project itself.⁽²⁾ In many cases the scientific reports were historical in their own right, as they had been written during the communist period, but often not published until shortly after. The contrasts between what scientists wanted to write (concerns about environmental impacts), and what the government claimed they were writing (reassurances that no impacts would occur), were perhaps the most striking features of this study.

Background to the Project

Hungary is not in a favourable geographical situation for the development of hydroelectric power, and has not been so since the imposition of the Treaty of Trianon at

2. Secondary historical sources were able to corroborate these accounts to a great degree of accuracy.

the end of WWI. That treaty deprived Hungary of its access to the Carpathian Mountains, leaving generally flat plains crossed by two major rivers- the Danube and the Tisza. The necessary ingredient for most efficient hydroelectric potential, steep gradients in narrow valleys, were no longer to be found within Hungarian borders, unlike the ample opportunities which had been present for Austro-Hungarian engineers prior to the war. Trianon deprived the traditional water lobby, then, of the possibility of most development, certainly in contrast to neighbours such as Austria and Romania. Hungarian hydrological engineers had enjoyed relatively high status in the government, and the loss of so much of their industry came as a hard blow to those committed to future economic development.

It was not only the difficulty of producing electricity from hydro plants which was problematic, but the necessity to integrate such plans into goals of irrigation, flood prevention, and navigation. As Emil Mosonyi remarked in 1948, such incomparable goals and geographical constraints made any future development in this area unlikely and expensive. Previously, it was conceivable that hydro-electric power could be produced in mountain valleys, while hydrological works concerned with irrigation and navigation were placed along the plains and low-lying river valleys of the Danube and Tisza. Yet if one were to produce power in one low-lying region, that would preclude the possibility of also developing irrigation and navigation projects. Hydro dams can often accommodate navigation canals and locks, but it is more difficult to integrate irrigation needs when a large basin is not available for reservoir formation. As a result of the lack of suitable geographical sites, no more than perhaps 7.5 billion kilowatt hours a year could be

produced in electricity by hydro plants. The concomitant existence of conflicting goals meant that only a small fraction of that could ever hope to be captured and turned into electricity.(3)

Yet the examples of Soviet mega-projects on the Volga and elsewhere seemed to serve as something of a model to which the Hungarians could (or were perhaps forced to) aspire. Hungary established a water management agency shortly after the war in 1945, to be headed by Mosonyi, and plans to develop post-war energy needs began to emerge the following year. The inception of the Tiszalök Barrage in the 1950s, and its subsequent defence by Hungarian and Soviet engineers, was something of a precursor to events surrounding Bős-Nagymaros. In fact, events around the Tisza River were important historical events for what later transpired on the Danube.

Very similar to Bős-Nagymaros in both form and effects, a number of hydraulic engineers pressured local people and their own agencies not to continue with construction of the project. They argued that, if built, the Tiszalök would create flooding and filtration problems, including sub-salinisation of agricultural lands. Yet to the political leadership, these projects were inspired by the perceived need for industrial development in Hungary, where natural resources were often scarce and ecosystems easily disrupted. They perceived the engineers to be opposing development of the state, and a great many of them were imprisoned or sent to collectives during the 1950s. This atmosphere persisted into the 1960s when Bős-Nagymaros was first seriously proposed, and it helped to stifle

3. János Vargha. 1981. "Egyre távolabb ajótól." [Ever farther from that which is good: Documents from the Gacikovo Nagymaros Barrage System's History] *Valóság*. 11, p.2.

criticism from the scientific and technical communities.

Although the Tisza area was the first to gain attention from developers, the area of the Danube around Visegrad was mentioned very early on, and it is reported that plans to develop the hydro potential around Nagymaros had existed perhaps as early as 1900. Stalin and Rákosi's ideas for industrial development provided justifications for such projects when they may not have existed earlier, and such political goals were defended by reference to scientific methodology, at least when it was felt necessary to defend them.

Despite concerns over changing groundwater levels, the high flood levels created by the project, and contamination of the water resulting from the first two factors, plans for the barrage system on the Tisza River were defended as entirely scientific.⁽⁴⁾ At a 1951 hydrology conference, Gyula Hevesi claimed that the system under which they were working provided an atmosphere entirely amenable to scientific work, despite the fact that most of the baseline data with which they were working were later found to be flawed or fabricated.

This conference . . . bears witness to the fact that our experts are more and more willing to recognize the significance and the use of criticism and of the Marxist dialectic method, which places a great weapon in our hands in the defence of that which we know is right against improper and pseudo-scientific attacks . . .⁽⁵⁾

This overconfidence carried over into plans for the Bős-Nagymaros project, which the government unveiled in 1952, just two years before final construction was completed at

4. Author's interview with János Vargha, Budapest, Hungary, 23 March 2000.

5. As quoted in : Vargha. 1981, *op.cit.*, p. 5.

Tiszaölök.

For those with concerns regarding Tiszaölök, they were unable to take advantage of Hevesi's ideas regarding criticism, even though many of the people most concerned about its effects were scientists, themselves. The institutional structure of scientific research and planning under the Rákosi era was not terribly amenable to science and criticism, but authorities maintained that any work carried out was in accordance with scientific methodology and therefore justified. The Hungarian government was able to produce a facade of agreement and unanimity, but this hid the reservations many held regarding the effects of industrial development upon water resources and quality in Hungary. Plans for heavy industrialization of the country were considered paramount, and any concern or criticism of such plans were considered treasonous and contrary to the aims of communism.

Any hopes that this atmosphere would change after Stalin were premature. Those supporting industrial and hydro development continued to control much of the debate and research surrounding their plans, and discussion of the political goals and values behind the projects was kept to an absolute minimum. Rákosi was deposed in 1953, shortly after Stalin's death, and the course taken by his successor, Imre Nagy, promised to undo plans for heavy industrialization. Such ideas never came to fruition, for they were adamantly opposed by Rákosi and the old guard in the Hungarian Worker's Party, who had Nagy dismissed in 1955. In order to appease Tito and the USSR, Khrushchev would not allow Rákosi to come to power again after 1956, but Rákosi's hand-picked successor, Gerő, was every bit as fanatical to heavy industrialization as Rákosi, and the Kádár regime

could not and would not make fundamental changes after the aborted revolution of 1956.⁶ The Five Year Plans were as important as ever, and Soviet-trained engineers had great influence over Hungarian plans for water management during this period.

For those who had a particular interest or stake in developing water projects, the possibility of damaging effects from these plans were becoming apparent. The Hungarian Academy of Sciences (MTA) began investigating problems with water quality in Lake Balaton as early as 1960, and problems of water contamination were fairly well known among the scientific community at this time. Such information was never admissible in public, as such environmentally-related reports were always kept confidential, assuming that the research was approved, in the first place. Any information regarding negative effects of hydro-development projects was to be kept confidential, and no scientist with access to such information could address such problems without risking his own career and freedom. It was in such an atmosphere that the Bős-Nagymaros plans were introduced and construction first started.

Thus the project was born in an atmosphere of Soviet-dominated ideology, where science and quantification served as legitimating principles that had primacy over alternative considerations. Yet it should be kept in mind that as with all Soviet-style projects, the term 'science' was one defined loosely, applied only to those research outcomes that did not contradict the wishes of the central state. That such wishes or goals could change over time indicates that scientific conclusions were allowed to/forced to change, as well, and just such processes did occur over the history of the Bős-Nagymaros

6. See C.A. Macartney. 1962. *Hungary*. Chicago: Aldine, pp. 239-243.

project.

Scope of Plans

The Bős-Nagymaros plans were incredibly ambitious, envisaging several dams/barrages along the Danube and a 25.2 km bypass navigation canal.⁽⁷⁾ The first dam would be located at Dunakiliti Hrušov (Dunakörtlő) on the Hungarian-Slovakian border, creating a reservoir of 60 square kilometres, and installing a power plant producing 720 megawatts of electricity. The Nagymaros dam would create a reservoir of 68 square kilometres, and would include a power plant producing 160 megawatts of peak-time electricity.⁽⁸⁾ Both the construction of and power generated by the power plants would be shared equally between Hungary and Czechoslovakia, as the project occupied areas straddling the border between the two states. The project was considered a way of unifying the Warsaw Pact states in common development, and for the Hungarians it represented one of the last places upon which any dams could be built within the country. Thus, for those in the water lobby, it held great symbolic and political importance; hydrological engineers in Hungary could not well maintain their status without its construction.

Several justifications for the project were forwarded. The first argued that the Bős-Nagymaros project could produce additional electrical power for both countries,

7. See Figure 1.

8. László Góczán and Dénes Lóczy. 1990. "The Slovak-Hungarian Barrage System on the Danube River and its Environmental Problems." *Geographica Polonica*. 58, pp. 89-98.

power which was sorely needed for continued industrial development. Another justification was claimed to be that of navigation. The Danube serves as a main waterway through East-Central Europe, and it was argued that additional development of navigation canals would facilitate trade and cooperation among eastern countries. Finally, periodic floods had impacted the region around the Duna-Kör (Danube Bend) and Szigetköz (Middle Island) regions, the most damaging of these occurring in 1954 (in Hungary) and 1965 (in Slovakia). The plans claimed that construction of dams would help prevent further floods, even though earlier efforts to contain Danube waters had fallen short.

Short History of the Project

Initial Planning Stages

The idea of a hydroelectric dam on the Danube between what is now Hungary and Slovakia was first proposed as early as 1880, although the First World War and intervening Treaty of Trianon set aside any hopes for construction for many years. It was not until after both Czechoslovakia and Hungary came under communist rule after World War Two that the idea resurfaced, and was proposed as part of a larger industrial development of the Danube Basin. 1952 saw the first talks between Hungary and Czechoslovakia on the possibility of a joint project between the two countries, and the serious floods which followed two years later in Hungary served as a serious impetus to begin such a project in earnest. That same year, the Hungarian Water Management Plan officially proposed the Bős-Nagymaros project, although the initial planning for the

project did not go as smoothly as some would have hoped. The original talks focussed a great deal on navigation and flood prevention, and it was not easy to gain approval for the proposed plans. One of the first proposals sent to the respective governments was, interestingly enough, turned down by Hungarian Prime Minister Gerö on economic and environmental grounds, particularly as it related to the construction of a navigation side-arm into Slovakia.⁽⁹⁾

Czechoslovakia was also uneasy about the project from the start. Not only was it considered preferable to invest in the richer Czech lands than in Slovakia (owing to the greater political influence of Bohemian lands), but the energy benefits of the project were dubious, at best. It took jury-rigging of the cost-benefit analysis before the project would look even marginally beneficial (see below), but it was not until the floods of 1954 and 1965 that the project was taken seriously by central planners. In addition to this, development of the river upstream in Germany and Austria created conditions of higher erosion and less suitable navigation than had previously been the case, and by the early 1960s measures were deemed necessary to deal with a combination of flood control, energy production, and navigation concerns. Although a number of possible construction plans were laid out in advance, official planning for the project did not take place until 1962-1977. Under the terms of the plan, the two countries were to share both construction

9. This side-arm was later to become one of the most contentious issues of the Variant C model implemented by Slovakia. Part of the Hungarian's unease likely stemmed from proposals to shift the flow of the Danube into Slovakia, which would isolate even further Hungarian minorities in southern Slovakia. Just such a tactic was used to considerable effect by the French against the Germans after WWI along the Rhine.

and electrical use equally, making the project ideal for approval under COMECON.(10)

On September 16, 1977, Hungary and Czechoslovakia signed an official treaty for construction of the barrage project. Construction began the following year, with completion of the projected slated for the end of 1989. These events coincided with the development of an atmosphere more intolerant of internal dissent and uncertainty in Hungary, where competing experts were not allowed to question what was in the interests of the state.(11) This atmosphere was the resultant backlash from more liberal economic policies of the early 1970s, and some authors consider it no coincidence that the Hungarian government finally approved the dam project during this time.(12) Within such an atmosphere the water development lobby prevailed. It was not long, however, before problems arose from this vision of Bős-Nagymaros, and questions regarding its utility and its environmental effects were audibly raised.

The Emerging Opposition

The first protests against the dam occurred in Hungary in 1980 and 1981. Primarily unorganized farmers living in the region realized that their livelihood was going to be affected by the project. Such protests were kept low-key and were effectively

10. See John Fitzmaurice. 1998. *Damming the Danube*. Boulder: Westview Press, pp. 76-78.

11. *Ibid.*

12. See Tamás Fleischer. 1993. "Jaws on the Danube: Water Management, Regime Change and the Movement Against the Middle Danube Hydroelectric Dam." *International Journal of Urban and Regional Research*. 17, 3, pp. 429-443.

suppressed by Hungarian and Czechoslovak authorities, as were criticisms made by experts within the Hungarian Water Management Agency and the Scientific Institute of Water Management (VIZITERV). The charge against Bős-Nagymaros started primarily with one man, János Vargha, a biologist whose work in journalism brought him into contact with the local people who could predict the changes in water level and agriculture that the project would bring. Of course, those lacking in official expertise and working from qualitative knowledge would not be heeded if other experts had not been listened to. Yet Vargha was surprised at the high level of official censorship, which he felt himself when his critical report in *Buvár* was suppressed by Hungarian authorities. A second article was published in 1981, providing a larger historical background to the debate and serving as a stinging rebuke to the project's proponents. The state was not heeding outside warnings about the project, nor accepting constructive criticism regarding how to mitigate impacts; construction simply continued unabated.

Some second-guessing of the project did exist within the government, however, and in 1981 a temporary suspension was called on construction. The suspension did not occur so much because of the influence of internal dissent so much as the recognition that in Hungary resources were scarce, and that outside funding of the project would be necessary in order to ensure its completion. The competition for resources among the different energy lobbies called into question the effectiveness of hydro-power, which effectively allowed other organizations to follow suit and question Bős-Nagymaros, themselves. After 1981 Vargha was asked to participate in a committee of the Hungarian Academy of Sciences, which was detailed to produce a report on the environmental

effects of the project. At the same time, an environmental impact statement was undertaken on Bős-Nagymaros, which detailed many of the environmental damages which would occur if construction were completed.

By 1985, the Hungarian government had re-committed itself to the project, and in so doing suppressed all reports which were critical of Bős-Nagymaros, including the Academy of Sciences report. This 'information blackout' began in the previous year, in response to increased debate on the issue and more critical questions regarding its economic justification and environmental impact. Much of this again had to do with Vargha, who in 1984 established a grass-roots organization opposing the project. Before and after establishing the Duna-Kör (Danube Circle), Vargha was dismissed from two journalist positions because of his vocal involvement against the project, but he and others like him began an underground movement of debate and samizdat publishing. The questions raised earlier would not disappear, despite the government's best efforts to stifle debate and clamp down on critical literature.(13)

The project eventually became a litmus test for the then failing communist government. Ultimately, events in the 1980s grew beyond the control of the Hungarian government. Public discontent with what it considered the obvious problems of the project resulted in a mass petition campaign, which by 1984 had collected 10,000 signatures urging that the project be postponed and new plans introduced. A 30,000-strong demonstration in front of Parliament in 1988 forced the state to justify its support once more, and marked the first time during communist rule that a peaceful protest of

13. Author's interview with János Vargha, Budapest, Hungary, 23 March 2000.

such size was allowed. However, the justification needed by the government was forced along a party line vote. This event, which for the first time was televised to Hungarians, only served to discredit the government's position further by making visible what everyone had thought all along. By February 1989 140,000 people had signed a petition calling for a referendum on the project, a course of action the government could not risk at the time without losing. With reformist MP's using the project to attack the government, the state finally decided in May of 1989 to cancel Hungary's involvement in the Bős-Nagymaros project, repudiating the 1977 treaty.(14)

Slovakia insisted upon completing the project, and although the Nagymaros barrage was not built Slovakia managed to complete what became known as Variant C of the Bős-Nagymaros project. At the same time, Slovakia took Hungary to the World Court to protest its refusal to honour the 1977 treaty. In large part, Slovakia's desire to complete the project stemmed from its greater sunken cost in construction; had Hungary been further along in its construction timetable, it is likely that abandonment of the project would not have seemed as viable an option. Although it is beyond the scope of this study to comment at length upon the differing dynamics of politics within Czechoslovakia and Slovakia which allowed the project to proceed, it is nonetheless instructive to note that contrasting levels of debate and openness existed between the two countries. Try as Hungary might to control debate, it still allowed debate on Bős-Nagymaros to proceed at some levels, and simply tried to deny scientific research by fiat. This research strongly suggests that not all was well within ecological investigations.

14. A succinct history of these events is given in Fitzmaurice. 1998, *op.cit.*

The project disregarded and misused science in several ways. By constructing a process by which the research would only support decisions already made by central planning authorities, the Hungarian government twisted the research process and could not lay claim to having science 'justify' Bős-Nagymaros. Several major factors lead to the conclusion that science was abused in this process, including the cost-benefit analysis for the project, suppression of research projects concerning environmental damage, controlling the meetings and work of scientists detailed to the project, and suppression of reports criticising the project's effects and costs. Examination of each of these factors can help to explain the assumption underlying the planning for the project, and why the appearance of science was invoked to attempt to deny such political motives.

Initial Problems with Research in Hungary- the Cost Benefit Analysis

Technicism in Numbers

The first basis for legitimization of the project was to employ a cost benefit analysis (CBA), a tool commonly used in water resources planning. A cost-benefit analysis is the quantification of values to determine whether a proposed project is profitable or desirable, and despite the communist economy of Hungary, such an evaluation was included in plans leading up to the 1977 treaty promising construction between Hungary and Czechoslovakia. This was one of the primary means by which initial justification for the project was presented. Such analyses are considered part of technology analysis (TA), and in the US are considered an integral part of environmental assessment (EA), often

incurred as part of NEPA legislation. Relying upon economic theories, these CBAs provided much of the underlying scientific legitimation for the project.(15)

CBAs have a long history in the United States and France, particularly when used in conjunction with water projects, but their use has been very contentious.(16) Their use in a communist country is terribly curious, and suggests a continued commitment to quantification of politics even if working somewhat contrary to communist/socialist conceptions of labour as the unit of social measure and worth (as opposed to the profit motive inherent in most CBAs). Traditionally, the primary variables in a CBA are to compute the benefits in terms of power production or increased trade, and then divide into that construction costs of the water project. If a number above one results in the ratio, then the project is considered feasible and desirable. For example, a CBA which concludes that a project will have a ratio of 1.9 means that for every dollar invested in the project, 1.9 dollars will be produced in revenue.

A number of problems exist with CBAs, in general, however, in addition to a number of problems with respect to the Bős-Nagymaros project. First, a number of intangibles exist in any project, and values related to the environment are often incommensurable and difficult (if not impossible) to reduce to a monetary value. A dam

15. Some may disagree with a characterization of cost-benefit analyses as scientific, but they are little different in theory and practice than risk assessment or even some methods of epidemiology. Their appearance in the social sciences may create a false distinction, as the important point is that they are based upon quantification of (and hence, technocratic) policies. See Kristin Shrader-Frechette. 1985. *Science Policy, Ethics, and Economic Methodology*. Dordrecht, Netherlands: D. Reidel Publishers.

16. For a history of the development of CBA, see Theodore Porter. 1995. *Trust in Numbers*. Princeton: Princeton University Press.

project may be opposed by those who believe it will destroy the environment, yet who cannot claim economic or property damages as a result of its construction.(17) The logic is that any measurement in numbers will be more objective than judgements made otherwise. As John Adams wrote in relation to using CBA in risk measurement,

In this example we find the Kelvinist view of risk carried to its logical conclusion- if a risk exists it must exist in some quantity and can therefore be measured- and the only practicable measure, say the economists, is money. There is reason to suppose that such numbers are meaningless abstraction- even for economists who have a professional interest in them being meaningful.(18)

Formidable questions exist regarding what monetary values to put on factors, which factors to measure, and even whether such factors count as costs or benefits.

Beyond these basic problems, CBAs suffer from the problem of how to measure the future. That is, the discount rate used in assessing future costs and depreciation makes an enormous difference in determining the final cost-benefit ratio, yet the discount rate is often arbitrarily determined. Few guidelines exist as to how to determine what the most accurate rate is, and over the fifty-year lifespans of most dams, such rates generally become meaningless in relation to actual economic conditions. For example, if a cost-benefit ratio is determined by using a discount rate of 4 percent and then inflation rises to a level above this, the projected ratio would have to be revised far below the previous level.

17. A good discussion of incommensurable values in CBAs is written in Wendy Nelson Espeland. 1998. *The Struggle for Water*. Chicago: University of Chicago Press.

18. John Adams. 1999. *Risk-Benefit Analysis: Who wants it? Who needs it?* Paper presented at the Yale University Cost-Benefit Analysis Conference, p. 3.

Cost-benefit analyses must also be able to aggregate social values from individual preferences, a task which is difficult. This is not simply a matter of achieving Pareto Optimality, whereby the best alternative is where the most people benefit without anyone else being worse off. Nor can it be achieved so simply by using a more relaxed Kaldor-Hicks formulation of comparing marginal benefits to sufferers' willingness to accept compensation. Neither Rawl's conception of seeing that the least well-off be considered, nor the ideal that all individuals be given equal weight, can be accommodated by CBA methodologies.(19)

Finally, cost-benefit analyses suffer from the problem of employing too narrow a focus in their determinations. If a CBA is used to determine the profitability of constructing a dam project in a given area, this does not address the alternatives of building the dam. Is the irrigation needed? Is the power needed, or is there another way to achieve the same amount of power output? CBAs typically use only an either/or construction of the problem, and so therefore pre-determine part of the answer. If it is indeed determined that additional power output is needed, and the only proposed project in the CBA is a hydroelectric dam, then this biases the answer toward the dam and away from any other possible consideration. Even with these limitations, however, one could make the claim that they still represent a possible and objective decision-making tool if used properly.

19. Raymond J. Kopp, et.al. 1997. *Cost-Benefit Analysis and Regulatory Reform*. Discussion Paper 97-19. Washington, DC: Resources for the Future. October, 1997, pp. 13-14.

The Post-Justification of Bős-Nagymaros

A cost-benefit analysis was performed in Hungary, but one which systematically excluded any consideration of project externalities, and was not so much a decision-making tool as a way for planners to justify their plans. Thus the internal problems of CBAs were only compounded by disregard for their limitations and the hope that they would only justify what had already been decided. By emphasizing the benefits of the plan, while minimizing or suppressing discussion regarding negative effects, the plans could be justified in a manner consistent with the illusion of instrumental rationality. This framing of the problem involved the use of science, or at least its appearance in the guise of numbers. Even if it only served to paper over decisions already made, it is still necessary to inquire into the assumption made by the planners in producing the CBA. Rather, the distortions in the economic justifications for the project indicate deliberate choices on the part of planners, or as Fleischer writes,

On the other hand, financial return is not a real argument for the actual decision maker either. It is clear that decisions are not made upon this basis: profitability calculations are instruments of post-facto justification. It is important that to pinpoint distortions in the calculations would not set the decision-makers worrying, since these do not represent random, inadvertent errors on their behalf.(20)

Rather, the CBA was constructed in just such a way that it supported the biases of the planners, and systematically excluded any negative effects of the dams or otherwise

20. Tamás Fleischer. 1988. "Gazdaságtalonsági számítások: Makrogazdaság, környezet, politika és társadalom." [Non-efficiency calculations: Macroeconomics, environment, politics and society] *Delta-Impulzus*. IV (XLIII) évfolyam, 20, p. 3.

worrying omissions of fact.(21)

The cost-benefit analysis relied upon several key assumptions. The first was that the electricity generated by the hydroelectric plants was necessary for the countries involved, and that the dams were the best way to provide such power. Within the world-view of the hydrological engineers and water authorities, this may have made sense, for the only clear alternatives of action were those which furthered the role and capacity of hydro projects. Wider considerations regarding cost and why such hydro power was made necessary, were not or could not be made at that time. For instance, the Bős-Nagymaros project received its final impetus in the late 1970s during the OPEC crisis, when prices in oil made alternative sources of electricity generation even more attractive, Communist planners saw hydroelectric sources as viable alternatives, as the Soviets could earn more hard currency selling fossil fuels to the West. Normally, countries like Hungary, Czechoslovakia and Poland had to rely upon far less efficient and suitable sources of power generation, such as high-sulfur coal. But with a stable source of hydro-electric power, they could not only provide for their own power demand, but could even sell surplus electricity abroad. It is important to note, however, that these concerns did not arise until after the OPEC-induced oil crises of the 1970s. Had fossil fuel prices been lower around 1977, it is not certain that the Bős-Nagymaros project would have passed muster among central authorities, who were then looking for domestically available supplies of energy.

21. See also András Bródy. 1989. "A bős-nagymarosi vízlépcsőrendszer gazdaságosságáról." [On the Economics of the Bős-Nagymaros Water Barrage Project] in : *Utánunk az özönvíz*. Duna Kör (ed.), Budapest, Hungary: Felelős kiadó, pp. 85-88.

The planners realized this as the nature of debate changed, and had to re-figure the numbers to accord with the cost-benefits aspects of the plan. As Fitzmaurice explains,

In order to carry the day in this debate, the planners were obliged to postulate a demand for energy that had little firm basis and rejig their plans to maximise energy production, with accordingly inadequate concern for environmental consequences. . . . There was also between 1962 and 1977 a complex redefinition of the project as a multi-purpose project, permitting a more favourable reallocation of costs. Thus, in 1962, energy production had to carry a hypothetical 90 percent of costs, against 10 percent for other (mostly navigation) benefits. By 1977, this calculation was radically rebalanced– energy costs at 60 percent, navigation 16 percent, water management 11 percent and infrastructure 14 percent– without any fundamental change in the actual scheme.(22)

Claims that the Bős-Nagymaros project was economically competitive were therefore based more on illusion than any objective grounding, and such claims could only be made if some basic assumptions were not questions or overlooked.

What was even more perplexing, however, was that Hungary already had alternative sources of power generation available, and one source was particularly well suited to Hungarian geography– geothermal power. For the same amount of electrical output, Hungary could have built a geothermal plant for half the price of a similar hydroelectric plant, and without many of the associated environmental effects.(23) Yet despite the relative benefits of investing in a geothermal plant, such plans were never seriously considered. It is difficult to say exactly why this is so, for no documented records exist discussing the matter. Perhaps the visibility of a dam project was more

22. Fitzmaurice. 1998, *op.cit*, pp. 76-77.

23. See Vargha. 1981, *op.cit*, pp. 9-12.

desirable for the communist governments of the time, and fit well with efforts to tame nature in the Soviet Union.⁽²⁴⁾ The power of water agencies in the USSR could be easily understated, and the Soviets saw Danube projects as important political and economic unifiers. COMECON's Permanent Committee on Electrical Energy Affairs and Agriculture expressed interest as early as 1955, and ratified the initial plans in 1963.

If it was in the ethos of planners and engineers to consider the same technologies employed elsewhere in the Eastern Bloc, then Hungary's unique access the geothermal power could easily be overlooked in plans which had to be justified to Moscow. Certainly, a geothermal plant would have been a more desirable choice than either hydro or nuclear plants, yet they appeared to be systemically excluded from consideration between WWII and 1991. A geothermal plant would not have served the interests of the Hungarian Water Management Agency, under whose jurisdiction the project would be built, and it may well have been seen as too innovative in a system that did not encourage such behaviour. After all, the plans for the Danube dams had been on the drawing board for years; after a certain point, questioning such plans was equivalent to questioning the state itself, and few would forget what had happened to those who had criticized the Tiszalök project in the 1950s.

Whatever the case, the rationality of the Bős-Nagymaros project depended upon the ability to avoid such questions, and to silence any who may have raised them. It is not certain when the actual decision was made to go ahead with the plans, as they had

24. See Douglas Weiner. 1988. *Models of Nature*. Bloomington: Indiana University Press.

already been on the drawing boards for over twenty years at the time of the 1977 treaty, but certainly once the decision was made no questions were to be asked regarding whether it was the best choice. Thus the economic justifications for the plans were narrowly defined, alternatives went unstated, and additional grounds for construction were made on the basis of improved navigation and flood control. It was important that all three of the bases upon which construction was legitimated (power, flood control, navigation) were included together and not questioned, for such justifications could not stand on their own. The government would not support a purely navigation-oriented project which could cost hundreds of millions of dollars, even assuming that this project was the best way to achieve such a goal. Accommodating several parallel goals in water resource management projects is difficult, at best, while oftentimes attempts to do so cancel out predicted benefits.(25)

In general, the cost-benefit analysis set up for the Bős-Nagymaros project was heavily flawed, and would only benefit certain sectors of the Hungarian economy and government. The proposed project, viewed from a more general perspective, was not suitable for the country as a whole. This was the conclusion of Peter Hardi, whose government-appointed commission reported in 1989 that the project simply could not be justified in economic terms.(26) The original plans systematically excluded externalities,

25. See Edward Goldsmith and Nicholas Hildyard. 1984. "The Politics of Damming." *The Ecologist*. 14, 5-6, pp. 221-231.

26. It should be noted that the Hardi Commission was allowed to reach the conclusions it did only because, by this time, the Hungarian government was looking for a way to back out of its commitments to building the project. Similar earlier reports by the Academy of
(continued...)

cost overruns, and used a discount rate far lower than was justified (even before inflation became a serious problem in the late 1970s).(27) Furthermore, the payment scheme for construction of the dam put the original goals into question. After all, if the goal of the project was to produce electricity for use in Eastern Europe, then why would eighty percent of Hungary's share go to Austria, to help pay for contracting costs of construction? From the general point of view of Hungary, the country would receive most of the external costs of the project (i.e., environmental damage), while retaining very few benefits.(28) Then why undertake such a project?

It must be reemphasized that discussions of costs and benefits were merely 'window-dressings', for the real issue was political control and visibility. Tamás Fleischer observed that these were not random instances of overlooking conflicting data, that if the hydrological engineers had better data, then they would have made better decisions. In economic terms, such was not the case. Rather than invest in sorely needed sewers or protective flood dikes, a dam was both the most visible project, and the one most likely to

26.(...continued)

Sciences were suppressed because they did not conform with the wishes of the central authorities. The relative openness of debate by 1989 reflects, in large part, the inability of the Hungarian government to control it.

27. Hardi Report. 1989. *Expert Review for the Hungarian Council of Ministers on the ecological, environmental, technological, economic, international and legal issues of the Bős-Nagymaros Barrage System*. September 1989.

28. It is significant that the Hungarian government commissioned such a report in the first place, and indicates the general dissatisfaction within and pressure against the government in regards to the project.

win continuing support for future funding of the water authorities.⁽²⁹⁾ Most important, the project fit with preconceived ideas of what the water management agency was meant to accomplish. Outside considerations could only muddle decision-making and possibly prevent attainment of what the agency had been created to accomplish- water resources development.

This disregard for conflicting information or consideration would become even more apparent within the context of science and ecological research. Rather than simply trying to justify the project, the environmental sciences could produce information which would be embarrassing or potentially damaging to the goal of consensus regarding benefits of the project. As far the cost-benefit analysis was concerned, it provided a visible and purportedly objective justification for what was essentially a political decision. By putting the question into quantified terms, it was hoped that no one would notice the biases and assumptions built in to the decision. But inasmuch as the CBA was an act of goal displacement, the environmental impact assessments carried out around Bős-Nagymaros were examples of simple information control and manipulation.

Environmental Problems of Bős-Nagymaros

Water Diversions and Impacts

Concerns about Bős-Nagymaros regarding water flows and their resultant impacts upon the environment were made in Hungary as early as 1952. It is unlikely that the

29. Fleischer. 1988, *op.cit.*

hydrology experts detailed to the project were unaware of the dangers to groundwater levels, particularly to drinking water supplies of Budapest, and it is claimed that local farmers were well aware of the adverse consequences from the very beginning.⁽³⁰⁾ These concerns all stem from the project's requirement that, in order to fill both the navigation canal and provide for hydroelectric power, all but a small fraction of the Danube's flow must be diverted from the original riverbed. Of the average flow of 2000 metres per second which flowed through the Danube at the time of planning, only 200 cubic metres per second flow was to remain into the old Danube riverbed, although some estimates were even lower. The project would divert the rest into a concrete and asphalt-lined canal, and would re-enter the Danube at Bős. In short, the Danube would be diverted from its original course into an artificial canal, leaving the original riverbed dry and preventing ground seepage and filtration.

The area which this diversion would most affect is the Szigetköz region, an area rich in both wildlife and agriculture. This region, which lies predominantly within Hungary, contains some of the richest variety of wildlife in the lower Danubian basin, supporting sixty protected species of plants and the majority of fish species in Hungary. The area also supports some of the most productive agricultural land in Hungary, an enterprise which benefits from the close proximity of the river and its flooding. The Danube provides both the necessary groundwater to maintain agriculture without irrigation, as well as nutrient loads in the form of eroded topsoil carried downriver from Austria. In addition to this, the forests of the Szigetköz are the primary source of timber

30. These arguments are based upon documents found within Vargha. 1981, *op.cit.*

for Hungary, consisting primarily of poplars which rely upon periodic flooding of the Danube for soil and subsoil rejuvenation.(31)

The construction of the Bős-Nagymaros project would potentially create a number of negative environmental effects. The primary worries which were raised prior to construction of the barrage system were similar in nature to those of other dams and impoundments elsewhere in the world, and most directly revolve around questions of groundwater in and downstream of the Szigetköz region. The area downriver of Dunakiliti contains an immense storage area for underground water, one which provides nearly all the drinking water for both Bratislava and Budapest, and in total contains drinking water for nearly half the population of Hungary.(32) This water is generally contained within the alluvial cone of the Csallóköz Szigetköz, a gravel bed several hundred metres thick. Water is recharged from Danube flows in the surrounding area, but must first be filtered before it can become potable. As gravel is a poor filter for groundwater (compared to clay, for example, it has very low surface to volume ratio), the Csallóköz Szigetköz relies upon the filtration provided by the uppermost layers of topsoil. Such topsoil is often no more than a few centimetres thick, where active geological and organic systems help to filter the water before it reaches the lower gravel beds.(33)

31. Hungarian Academy of Sciences (MTA). 2000. *The Ecological and Environmental Risks of the Gabčíkovo Barrage System*. A Summary of the Report of the Working Group of the Hungarian Academy of Sciences handed over to the Slovak (Czechoslovak) Party, p. 6.

32. Góczán and Lóczy. 1990, *op.cit.*, pp. 89-98.

33. Mihály Erdélyi. 1990. "A Kisalföld hidrogeológiája a vízlépcsők megépítése előtt
(continued...)"

Several processes can combine to disrupt this filtration process and the ability of the Csallóköz Szigetköz to store suitable levels of water for both wildlife and agriculture in the region. The diversion of most water to the navigation canals, at the expense of the old Danube riverbed, can create a situation in which water tables tend to rise near the reservoirs, while dropping downriver.(34) Reservoirs create new areas of water impoundment and raise water levels in the nearby region, while water in asphalt and concrete-lined navigation canals is unable to reach underground storage areas. The changes in flow dynamics and groundwater levels also change the hydrostatic pressure in the soil, making filtration of the water difficult, or creating conditions in which salinisation (deposition of salty minerals in the soils) can occur at surface or subsurface levels.(35) This salinisation greatly decreases the organic content of the soils, making it much less suitable for either wildlife or agriculture. In addition, the constant dredging of the riverbed planned for the Danube as part of the project can greatly harm the soil necessary for water filtration and percolation, exacerbating the problems already mentioned above.

The lower flow levels in the riverbed may also result in higher levels of sedimentation above the barrage systems, because in lower flow conditions particulate

33.(...continued)

és után.” [Hydrogeology of the Kisaföld before and after construction of the barrage system] *Földrajzi Értesítő*. 39, pp. 7-27.

34. Zoltán Hankó. 1994. “Merre tart a Szigetköz élővilága? Hogyan állítható helyre a Szigetköz vízháztartása?” [How to maintain biological diversity in Szigetköz? How to restore water balance in the Szigetköz region?] *Hidrológiai Közlöny*. 74, 1, pp. 22-24.

35. MTA. 2000, *op.cit.*

matter in the water settles (which is why the dredging was called for in the first place). This can cloud the water and make it less suitable to wildlife in and around the river, as well as depositing toxic residues and septic wastes in one specific location. One estimate predicted a deposition of five centimetres of largely contaminated sludge per year.(36)

Downstream of the barrages, lack of sediment in the water can create erosion of the riverbed and banks, a process already well documented in similar projects.(37) Low flow rates also change the nutrient and oxygen dynamics of the river system, and tend to cause eutrophication and algae blooms, further deteriorating water quality in the region.(38)

Much of the water will come into contact with asphalt and similar coverings on the dykes and navigation canals, and the effects that chemical leaching will have upon water quality are still unknown.(39) Finally, the original plans called for peak-flow operations. Such operations of dams occur when water stored behind the reservoir is released at times when peak demand for electricity exists, usually at night, and often seasonally changing as well. This creates discontinuous flood conditions in the river, quite unlike what plants and wildlife depend upon for normal existence. Even if such operations would be curtailed, no flood conditions would exist at all, which is equally detrimental to the region. As well, construction of reservoirs, dikes, and canals can increase the downstream

36. Erdélyi. 1990, *op.cit.*, pp. 10.

37. Patrick McCully. 1998. *Silenced Rivers*. London: Zed Books.

38. É Ács and KT Kiss. 1991. "Investigation of periphytic algae in the Danube at Göd." *Arch. Hydrobiol. Algological Studies*. 62, pp. 47-67.

39. Erdélyi. 1990, *op.cit.*

water velocity, further increasing chances of the very floods the project claimed to prevent.(40)

It is not difficult to see what the general effects of such conditions would be upon the Szigetköz region. To an area with high quality agriculture and the highest level of diversity of wildlife in Hungary, the Bős-Nagymaros project could only create conditions detrimental to what had already existed. Any change in water level or quality would significantly impact these areas. Even a small drop in water levels can easily reduce crop production by fifty percent, as plant roots are no longer able to conduct water to the surface, thus creating conditions in which irrigation is necessary where farmers did not need it before.(41) A rise in water levels can cause severe problems, as well. If the water table rises too close to the surface, it can create conditions where anaerobic processes begin to take place in the soil, thereby depleting oxygen and mineral reserves in the soils. Fields can also become waterlogged, creating marshy conditions where crops cannot grow, or where farmers cannot access the fields to harvest them if they did grow properly.(42)

The question of drinking water also remains of prime importance. Because of priorities in government planning, investment in areas of public sanitation in Hungary and

40. D.M Rosenberg, R.A. Bodaly and P.J. Usher. 1995. "Environmental and social impacts of large scale hydroelectric development: who is listening?" *Global Environmental Change*. 5, 2, pp. 127-148.

41. Perhaps not coincidentally, the need for irrigation would necessitate further investment in water resource management projects.

42. MTA. 2000, *op.cit.*

Czechoslovakia was relatively low. Not only were numerous chemicals deposited in the Danube without proper treatment, but sewage treatment levels in Hungary and Slovakia were (and remain) a major problem. At the time of dam construction, only thirty percent of water released into the river was treated in any way.⁽⁴³⁾ By 1991, fully a third of Hungarian municipalities were reporting water quality problems, mostly related to high levels of bacteria.⁽⁴⁴⁾ By creating new reservoirs just downstream of Bratislava, such conditions could only worsen. By dumping untreated effluent into the river (not to mention the pollution from chemical plants in and near Bratislava), then trapping that water while depriving the river of any ability to filter it, problems of water quality were almost certain to become a major concern.

Uncertainty Absorption and the Attempt to Ignore Damaging Information

Slovakia has been slow to release any detailed information on water quality near the project site, but initial studies have indicated that the Hungarian ecologists' concerns over the issue were well-founded. In 1993, only a few years after completion of the barrage at Bős, water tables both upstream and downstream have changed by as much as 3 metres. In addition, fourteen percent of test well samples taken contained illegal levels

43. Mihály Erdélyi. 1983. "A Győr-medence természeti-gazdasági értékei és a tervezett vízlépcső." [Natural and Economic Resources of the Győr Basin and the barrage project] *Földrajzi Értesítő*. 3-4, pp. 457-489.

44. Brooks W. Newbry. 1994. "The Hungarian Water and Wastewater Industry: Past, Present and Future." *Water Science and Technology*. 30, 5, p. 80.

of pollutants, including ammonia, hydrogen sulphide, dicloroethane, dichlorobenzene and pentachlorophenol. Oxygen levels were reduced by as much as three-quarters of normal levels, further aggravating ecological stresses in the area.(45)

The project at Tiszaölök produced similar problems, and the Tiszaölök barrage also had its critics who predicted that water table levels surrounding the new reservoirs and altered riverbeds would make nearby agricultural lands unproductive. Such critics were forced to keep such concerns to themselves, however, and the same process occurred during debate on the Bős-Nagymaros project. Such problems were kept under wraps not because of a lack of will on the part of researchers, nor was it necessarily conscious decision-making which was at work. Rather, information detrimental to the goals of constructing the Bős-Nagymaros project was systematically suppressed because administrative procedures in Hungary would not and *could not* allow conflicting information. To allow scientific and/or public debate on the subject would only undermine the fragile basis upon which the project had been justified, and might well allow new conclusions to be reached.

The Non-Scientific Hungarian State, 1950-1990

Processes of Bias in Hungarian Research

When it came to justifying Bős-Nagymaros in scientific terms, the Hungarian

45. Debora MacKenzie. 1993. "Dam Pollution Data Leaked from Slovakia." *New Scientist*. 8 May 1993, p. 7.

state took a course of policy which well matches the description of an 'action organization' given earlier. Recall that in order to most efficiently achieve a set goal in a bureaucratic atmosphere, three conditions are necessary: reducing alternatives of choice, ignoring or suppressing evidence of negative consequences, and starting from the goal and creating justifications afterwards. These conditions, when combined with the process of uncertainty absorption in administration, created in Hungary conditions where science was no longer science, and where the public was not intended to play any role. But by claiming that it was basing its decisions upon science, the Hungarian state hoped to absolve itself from the responsibility of having made such commitments. In other words, it could do whatever it wanted, and was not accountable to either the concerns of the public or the evidence of research.

At first glance, it is perhaps difficult to understand how many environmental problems associated with Bős-Nagymaros could not only be ignored, but how proponents of the project could attempt to claim that the barrage system was ecologically sound, and that any environmental effects have been positive.⁽⁴⁶⁾ Sibl put the issue in no uncertain terms when he wrote,

The Slovak dam builder's conclusions are inadequate, misleading, and irresponsible because they intentionally neglected the extensive environmental destruction caused by the construction and operation of the Gabčíkovo

46. See Igor Mucha. 1995. "The Gabčíkovo Part of the Hydroelectric Power Project, Gabčíkovo-Nagymaros Environmental Impact Review", in : *Gabčíkovo-Nagymaros Hydropower Project: Gabčíkovo Part of the Hydroelectric Power Project Environmental Impact Review*. Mucha (ed.), Bratislava: Q111 Publishers, pp. 315-322.

project.(47)

To say that such actions were deliberate may be slightly misleading, for not all conclusions reached from research were intended outcomes. One of the most important lessons of examining science in the context of administrative organizations is that negligence becomes a collective label- it does not necessarily apply to any one individual or set of individuals. One may say that the water management agencies were negligent even while the researchers were acting according to the rules set out by that organization. But since organizations run according to political rather than scientific goals, the outcome of research may be constrained or predetermined. In other words, what Sibl may have been referring to was collective irresponsibility and goal displacement, but it was not necessarily deliberate.

The political aspects of research surrounding Bős-Nagymaros were troubling. Having set a goal to build the project (or perhaps later, looking for excuses not to build it), the responsible political agencies set out to control information surrounding the impacts of construction and operation. In so doing, however, they often negated any scientific value of the research being undertaken. Geographers assigned to the project from the Hungarian and Czechoslovak Academies of Science were under orders to operate as in a political situation. Meetings between the two sides took place, but were controlled and largely social affairs; neither government wished any actual research to

47. Jaromir Sibl. 1993. *Damming the Danube: Critique of the Gabčíkovo Dam Project*. Bratislava: SZOPK, p. 78.

take place.(48)

For those who did carry out research surrounding the project, they were severely constrained in manner in which they could study ecological impacts of Bős-Nagymaros. Geography between the two countries made this especially problematic, for environmental impacts would be different on either side of the border. Slovakia, being upstream of Hungary, would experience a general rise in water tables at the same time that Hungary would suffer declines.(49) The accumulation of toxic sludge in reservoir areas would occur mostly in Slovakia, while toxic water flows and erosion would be more of a problem in Hungary. Despite the differences, all the environmental impacts of Bős-Nagymaros would be interrelated, meaning that assessment of the project as a whole would necessitate ecological studies of the entire Danube basin between Bratislava and Budapest. Needless to say, this did not occur. With cooperation between scientists neither allowed nor encouraged, the studies carried out prior to 1990 were severely constrained in scope. Slovakian assessments of the project would fail to take into account any environmental impacts in Hungary, while Hungarian studies were not allowed access to information regarding construction works in Slovakia. This meant that Hungary would have to assess the project without taking into account the very structures that would most

48. Author's interview with Dénes Lóczy, Pécs, Hungary, 3 April 2000.

49. János Tóth. 1983. "A Bős-Nagymaros Vízlépcsőrendszer Környezeti Hatásairól és Néhány Várható Ökológiai Problémájáról." [About Some Predictable Ecological Problems and Environmental Impacts of the Bős-Nagymaros Barrage System] *Földrajzi Közlemények*. XXXI, 1, pp. 1-11.

harm the environment in Hungary, if only because they happened to lie in Slovakia.(50)

Turning Political (Contextual) into 'Scientific' (Constitutive) Values

Ecologists typically have to make methodological value judgements as to what scope a study should have. This choice can greatly affect the outcome of the research, so it is important for life scientists to attempt to make the most appropriate decision for the circumstances. Disagreements can and do occur on this basis, but such objections are centred within the methodologies themselves. If, however, scientists are not allowed to make any decision in this regards, if the most important contributing factors to a river study are disallowed because of political borders (even when the border happens to be the river itself), then the outcome of the science becomes predetermined by political values. This is different from claiming that the research process was simply influenced by politics, and is why Sibl has claim to the remark that such actions in the Bős-Nagymaros project were, in fact, deliberate. The outcome of research concerning environmental impacts was never meant to be in question; administrative processes were deliberately (even if unconsciously) put in place to ensure that research would only support decisions previously made in Hungary.

Another way in which the state could maintain control over research was by

50. For example, see Mucha. 1995, *op.cit.* ; Jozef Krcho. 1995. "The Faculty of Natural Sciences of Comenius University and the Monitoring of the Impact of the Gabčíkovo Hydropower Structures on Individual Landscape Components", in : *Gabčíkovo-Nagymaros Hydropower Project: Gabčíkovo Part of the Hydroelectric Power Project Environmental Impact Review*. Mucha (ed.), Bratislava: Q111 Publishers, pp. 1-4.

simply prohibiting any research from taking place. Prior to 1976, no environmental studies were undertaken regarding consequences of the dam, and the government controlled feasibility studies so that no mention would be made of any negative externalities. Other studies were tolerated, but had to be undertaken with less than full information made available to the researchers. Some independent studies written in the 1980s had to extrapolate effects based upon water release levels proposed under the original treaty, rather than using data from changes to the barrage plans made since that time.⁽⁵¹⁾ Since these changes were not made public, even to researchers working with the project, actual impacts could not be predicted with any measure of accuracy.

Researchers themselves were also implicated in providing falsified or highly misleading information. As the farmers living in the Szigetköz were not consulted regarding the impact of the project upon agriculture, scientific studies had to be produced in order to 'prove' that no harm would be done. This could only be accomplished by drawing conclusions which contradicted the data, as in a 1976 study completed by the Water Research Institute. This study, which concluded in its executive summary that massive reductions in water flow in the old Danube river bed would not adversely affect agriculture in the Szigetköz (in fact, it claims that the project will improve matters), contradicts what is written in the study itself. Rather than the Danube flow reduction being mitigated by alternative sources, the bulk of the report contains the passage,

51. For example, János Balogh and Dénes Lóczy. 1992. "A Dunakiliti Víz tározó Megépítése Utáni Talajvízszint-Változás Hatása a Szigetköz Geomorfológiai Fáciéseire." [Geomorphological Facies of the Szigetköz Affected by Water-Level Changes Subsequent to the Reservoir Construction at Dunakiliti] *Földrajzi Értesítő*. XLI, 1-4, pp. 115-125.

“The Szigetköz groundwater situation is decisively influenced by the flow of water through the Danube. Other influencing factors. . . are capable of only local, lesser influence.”(52)

According to scientists who worked in this area at the time, such conclusions were not rare. It was often decreed (secretly, of course) that conclusions of research projects must fit what the government wanted to be made known, even if the data said otherwise.

Researchers either had to change conclusions or the government could simply suppress whatever it disliked. Such a situation, of course, acted as an incentive for scientists to do what the government desired, lest they lose their positions. A major problem of prediction facing scientists with Bős-Nagymaros was often in trying to predict what the government wanted. Even when the Hungarian government seemed to exhibit some discomfort regarding the future of the project, it still wanted to control what was said or written regarding possible consequences. The Hungarian Academy of Sciences released a 1983 recommendation that work on the project be suspended, but this was allowed only because it was in the interests of the Hungarian government at the time to do so.(53) Yet by the time that the Academy of Sciences recommendation of postponing the project was ready, political actors had already ruled out such an option, and the decision was kept secret.(54) The National Council for Environmental Protection was

52. As quoted in Vargha. 1981, *op.cit.*, p.9.

53. At the time, the Hungarian government was attempting (largely due to budget shortfalls) to extend the construction period called for in the original 1977 treaty.

54. See Fleischer. 1993, *op.cit.*; Hungarian Academy of Sciences (MTA). 1983. A *Magyar Tudományos Akadémia Elnökségének 1983 december 20-i határozata*. [The
(continued...)]

finally commissioned to conduct an environmental impact assessment of Bős-Nagymaros in the early 1980s, which identified severe concerns regarding the possibilities of conservation damage in the Szigetköz region, along the lines predicted earlier by Vargha.(55) Yet the state did not make this report public, and attempts were made to keep discussion of such matters under strict control.(56)

Although the uncertain nature of the ecological sciences generally precludes any accurate form of prediction (57), one can argue that planners could have easily foretold these events. Despite claims that the project has positively affected the region, and provided “ecologically safe” electrical production(58), the literature surrounding adverse environmental impacts of analogous dam projects is quite extensive.(59) A similar project was built on the Rhine between France and Germany, and the Tisza-örség barrage in

54.(...continued)

Hungarian Academy of Sciences Secretariat's Recommendation of 20 December 1983.]

55. Imre Dosztányi. 1985. “Komplex környezeti hatásvizsgálatok a Bős (Gabčíkovo)-Nagymaros Vízlépcsőrendszer.” [The Bős-Nagymaros Barrage System in the light of comprehensive environmental impact statement] *Búvár*. 5, pp. 204-207.

56. György Jakus. 1988. “A Bős-Nagymarosi Vízlépcsőrendszer Hatásai a Szigetközben.” [Effect of the Bős-Nagymaros Barrage System in the Szigetköz] *Földrajzi Közlemények*, 3-4, pp. 221-228.

57. See Kristin Shrader-Frechette and E.D. McCoy. 1993. *Method in Ecology: Strategies for Conservation*. Cambridge: Cambridge University Press.

58. For example, Slovak Information Agency. 1997. “For the benefit of people and Nature: The Gabčíkovo megaproject speaks for itself.” *Slovakia Today*. 3, 19.

59. Edward Goldsmith and Nicholas Hildyard (eds.). 1992. *The Social and Environmental Effects of Large Dams: Volume III, A Review of the Literature*. Bodmin: Abbey Press.

Hungary produced many of the same problems which had been foretold regarding Bős-Nagymaros. The sub-salinisation of the soil, the creation of marshy conditions in farmland surrounding the project, contamination of the water, and problems with maintenance of groundwater levels, were all found to have occurred as a result of construction at Tiszaölk.⁽⁶⁰⁾ Ironically, though not surprisingly, such outcomes had been ruled out in the early 1950s for being unfounded, and the Hungarian water lobby had full faith that they could manage or mitigate any such problems which could arise.

The environmental effects of the project were predicted early on, and many of these conditions now exist because of the implementation of Variant C by the Slovakian government. The substantial reduction in flow from the old Danube River bed to the navigation canal, construction of new reservoirs at Dunakiliti and Nagymaros, and the use of peak-flow to gain the most electricity from a hydro plant, all contributed to a plan which has created massive environmental dislocation. The Szigetköz region, in particular, has been hit hard by changes in water level, sedimentation rates, toxicity of the water, and changes in flood patterns. Both the changes in water flow and supply caused by the project have threatened this region both environmentally and agriculturally.⁽⁶¹⁾ The problems attending such a large project were (and remain) quite severe, despite claims by some in the Slovakian government or those in the Hungarian water lobby that any allegations of damages were unsubstantiated, or merely made by 'environmental

60. Author's interview with János Vargha, Budapest, Hungary, 23 March 2000.

61. World Wildlife Fund. 1998. *Recommendations by WWF and Independent Scientists*. (Downloaded from <http://www.goodpoint.com/duna/wwf/recommend.htm> 1 October 1998)

extremists'.(62) However, because of administrative politics and the exclusion of the public by 'expert' rule, engineers did not consider such damage when planning for the barrage system.

The Fate of Bős-Nagymaros

Pseudo-Science and Hungarian Administration

When it came to justifying Bős-Nagymaros in scientific terms, the Hungarian state took a course of policy which well matches the description of an 'action organization' described in Chapter 3. These conditions, when combined with the process of uncertainty absorption in administration, created in Hungary conditions where science was no longer science, and no public accountability existed for technical (in)competence. But by claiming that it was basing its decisions upon science, the Hungarian state hoped to absolve itself from the responsibility of having made such commitments. In other words, it could do whatever it wanted, and was not accountable to either the concerns of the public or the evidence of research.(63)

These may not even have been conscious decisions, for the political institutions put into place often overrode efforts at research and wider debate. Vargha quotes one

62. Miroslav B Liška. 1998. *To Develop the Danube or Not ... That is a Question*. Report by the Vodohospodárska výstavba, Bratislava, Slovakia, 18 February 1998.

63. Keep in mind that even technical competence, when employed in government, can only be effectively used as a legitimating factor when it is measurable and observable, either by the public and/or other technical experts/scientists. This can be fabricated to a certain extent, but once discrepancies appear, legitimacy fails.

water management director, Domokos Varga, as writing,

I don't know how this works. Somehow, we work [on] each other, here in the central office. Many times, it's not even we who move the machinery, but rather, the machinery moves us. Briefings, meetings, updates, plans, budgets, public affairs, private affairs, inspections, reports, labor resource management, financial management, water management. In the meantime, however, we have less and less opportunity to directly work with practical matters, with reality.(64)

The entire enterprise could not be considered scientific, because the associated organizations could never examine alternatives or take into consideration conflicting information. To do so would be to admit that the project was deficient in some way, and that alternative considerations were required. It was exactly these alternative considerations, whether they were economic or environmental, which would be able to prevent the completion of the Bős-Nagymaros project. Any admission by the government that its vision of the proposed project was unrealistic and could have been defined differently, would result in a breakdown of the instrumental vision upon which the state relied. The project could only be justified as long as decision makers systematically excluded certain information from analysis, and construction of the project was considered the only acceptable alternative. In other words, the Bős-Nagymaros project was rational only as long as it was not scientific.

The Hungarian government reduced alternatives of choice from the very beginning, the most damning evidence of which is found in the project's cost-benefit analysis. The CBA completely excluded alternative considerations regarding geo-thermal

64. Vargha. 1981, *op.cit*, pp. 14-15.

power, and jury-rigged numbers in order to increase hydro-power cost efficiency forecasts. Negative information was suppressed from environmental reports, conclusions were changed in reports, and those who dared to published unfavourable information were removed from their positions of authority.

The Fate of Nagymaros

Why was the project eventually cancelled in Hungary? Essentially, those outside the water lobby no longer saw the project as a rational enterprise. The public, including both local populations and scientists, was able to shift the definition of rationality away from one of a technical administrative process. By expanding the scope of analysis to include economic and environmental considerations, it became obvious that the stated goals of the project no longer matched its reality. It is said that wisdom is better expressed in the questions one asks than in the answers one gives. If this is true, then the wisdom of rejecting Bős-Nagymaros lay in the ability of the public to ask different questions than the project's proponents, to challenge narrow perspectives in light of available information. It is true that the project was used by reformers within the government against hard-line socialists, and this ultimately caused the demise of Hungarian support for the dams. These reformers, however, would never have used Bős-Nagymaros unless it had already emerged as a high-profile issue, and if it had not been so highly symbolic of the power of the state.

It is important to note, however, that such processes of shifting rationality can be made possible in more than just communist systems. Institutionalized environmental

assessment procedures can allow similar political processes, and numerous examples of just such issues exist in the US.⁽⁶⁵⁾ Equally important is the consideration that these are not simply matters of an informed cadre of elites versus the ill-informed public. Such a simple caricature of political processes is somewhat dangerous. It assumes both that (largely) self-appointed experts know what is best for others, and that those same experts will not be excluded from this process.

The first point has already been mentioned, in that certain groups of experts may have more knowledge than others, but lack the perspective to see the larger consequences of their proposed actions. Narrow definitions tend to produce narrow benefits, while the costs are imposed upon a much larger section of the population. As to those who may ask, what if the public is wrong? The simplest reply is to consider what questions they are asking. Are they appropriate to the problem? If they are not, perhaps the state has defined them so as to presuppose a self-serving answer. Perhaps the public is not wrong so much as it is attempting to answer a different question. If the framing of the question is not suitable, then generally neither is the answer.

The second point is equally important, and just as often overlooked. In discussions of 'what is best' for the public, experts often ignore the fact that they are also members of the public. If they allow that rule by the few is the best form of governance, then they risk exclusion, themselves. In such a structure it is not necessarily the best and the brightest who rise to the top, but those who can work most effectively within the system. As the analysis above suggests, those who work most effectively within a central administrative

65. See, for example, Espeland. 1998, *op.cit.*

system may also be those who are most opposed to scientific and democratic methodologies. Rule by experts does not necessarily mean effective rule, unless 'effective' is narrowly defined to benefit the experts, themselves. Even if science were to work properly in administration, it could not settle political disputes simply by reference to its own knowledge. Science may be good at identifying problems, but is far less capable in determining the proper courses of action to solve them.

This was entirely the case in Hungary, where discussions of the dam project relied upon science because it was the only form of authority deemed legitimate. But in a system where alternative perspectives are allowed in the process, would it have even been necessary to rely upon expert assessments of the possible consequences? According to Vargha, one needed only to ask a peasant farmer in Szigetköz about what the consequences would be. Other than the processes of salinisation of the subsoil, they already knew of consequences long before the official assessments were carried out. In the end, this was what the government seemed to implicitly fear.

There were no questions of water management, environment or energy being raised: it was simply a political affair that steamrolled ahead, grinding opposing opinions beneath it. The tools of repression were all out of proportion to the weight of the opposing opinions: and it was precisely this that betrayed the plan's partisans' fear that the system, improvised with such difficulty as it was, might reveal how weak their base was.(66)

This, then, was the final irony of environmental politics in the closing days of Hungarian communism. Despite the facade of authoritarian rule and the assurances of

66. Fleischer. 1993, *op.cit.*, pp. 432-433.

science supporting state policies, ultimately the plan was presented in technical terms because of fears of public opinion. If a wider debate had been allowed from the start, the shortcomings and wastefulness of the project would have been apparent. The Hungarian water lobby thus had to rely upon the appearance of scientific legitimacy in order to stifle debate and make their own decisions more rational. The paradox was that both the methodologies and the legitimacy of science were not only under the control of the government, and so could also be turned against the project's proponents. In attempting to augment their own positions through technical arguments, the plan may have seemed more rational to some. Consequently, however, it was left open to attack and discontent once the framing of the questions was no longer under control of the proponents.

The opposition to the project was more widespread than Hungarian environmentalism, in general. It proved to be a lightning rod for discontent, for here was proof that the state was not acting in the interests of the people. The mere sight of the Nagymaros construction, at one of the most scenic areas of the Danube Bend, could not be explained away merely by reference to quantitative economic growth or socialist control over nature. The environmental problems were indicative of the system, itself, and citizen participation was the only recourse.⁽⁶⁷⁾

The Hungarian public, from Szigetköz farmers to Academy of Science researchers, were able to open the debate that had for so long been closed to them. By expressing divergent values, and pointing out that the state did not have a monopoly on

67. See Miklós Persányi. 1993. "Red Pollution, Green Evolution: Environmentalists and Societal Transition", in : *Environmental Action in Eastern Europe: Responses to Crisis*. Jancar-Webster (ed.), London: M.E. Sharpe, pp. 134-157.

political realities in the country, the environmental debate could illustrate the fragility of the state's legitimacy. The illusion of the instrumental vision had failed. Perhaps it is not a coincidence that the government failed soon afterwards. These events came about because of the inability of Hungarian state administration to properly conduct or handle scientific research regarding the Danube projects. Attempting to explain away political interests in terms of quantitative analyses and reassurances that no environmental harm would result from the barrages, the Hungarian Water Management Agency's legitimating principles (those of technical knowledge and scientific research) were never substantive. Administrative politics were always placed ahead of scientific research.

Chapter Five

Norway and the Alta Dam Legacy

The church says that the Earth is flat, but I have seen the shadow on the moon and I have more faith in the shadow than in the church.

- Ferdinand Magellan

The development of the Alta dam in northern Norway provides another excellent example of the uneasy relationship between science and administrative policy. The Alta dam, like the Bős-Nagymaros barrage system in Hungary and the Animas-La Plata in the US, was conceived early on and planning for the project began in the early 1960s. Yet the plan also met with resistance from local residents, environmental activists, and scientists who claimed that the data employed in legislating the project were false or highly misleading. As a development project, the dam became largely symbolic. To the state government in Oslo it represented the prospect for greater development and extension of sovereignty in the north, while northerners saw the dam as interference and an attempt to destroy the unique identity of those living in the arctic.

The Alta dam was, at its most basic, a stunning example of the misuse of science in administrative politics. Its early inception and justification were based upon fraudulent energy forecasts and cost-benefits analyses, with plans held in secret and lacking any input from local residents until late in the process. Subsequent debates on the matter saw a consistent refusal by state authorities to publish or heed any information on the environmental and social impacts of the dam. Whatever the real reasons or justifications

for construction of the dam, scientific research could not be used to support such goals without systematic tampering, censorship, and withholding of such evidence.

The Alta dam was chosen as a case study because of the remarkable similarity which existed in some respects between this case in Norway, and others in the US and Hungary. The Alta dam captured the imagination of much of Norway for many of the same reasons that Bős-Nagymaros was a potent symbol in Hungary. It well represented the contradictions between supposed democratic rule, and the employment of technocratic elites who justified their actions in reference to expert knowledge. The visible irony of Alta was, like in Hungary, that locals often knew the area better and were better at predicting the dam's environmental and social impacts than were the experts (most of whom were in Oslo). This became more and more apparent as time wore on, and the administrative elites had to try ever harder to control information and the terms of debate. Scientific research was one of the first casualties of these government policies.

The following case study will examine the background to construction of the dam, including its early planning stages and the highly vocal and visible opposition to the project in Norway. The background will explain both why the government in Oslo desired such a project, and why local opposition only seemed to stiffen resolve to see the dam completed. The case will then go on to explain the environmental and social effects of the dam, both as they had been predicted and have developed consequent to its final construction in 1987. This chapter ends with an analysis of how and why the administrative government in Oslo misused scientific research and evidence, and why rationality for the project was not connected to the justifications given.

Background

The plans for the Alta dam operated under tight secrecy, and even today many of the relevant documents which must have existed prior to 1970 no longer exist or are inaccessible. Norwegian freedom of information laws (*Foraltinglov*) did not exist until the 1980s, by which time the construction of the Alta dam had become uncontested, even while there emerged a consensus that enormous mistakes had been made. In addition to this, most media sources in Norway at the time were either reticent or opposed to criticizing the government, and strong indications exist that self-censorship was present at the time. This means that historical documents regarding Alta are nearly as difficult to obtain as were documents related to the Bős-Nagymaros dams in Hungary. In order to confirm the accuracy of the information cited in this chapter, interviews were conducted with people in Norway who had been directly involved in *Altasaken* ('the Alta saga') in the 1970s and 1980s. These, combined with government reports, independent assessments, and historical accounts of the debate, portray a picture of state administration far removed from its mandate to justify its actions by reference either to public will or to 'objective' research.

Development of Hydroelectricity in Norway

Norway is a unique case in the matter of water politics and dams, as the country receives all of its electricity production from hydroelectric sources. As the world's sixth largest hydropower producer, yet with a population of only four and a half million people,

its per capita production from such sources is much higher than the rest of the world. This is the result of its geography, a rugged, mountainous country with few plains and many fast-flowing rivers, making it ideal for development of dams and other water management projects. In fact, Norway is the world's largest per capita consumer of electricity (at 25,882 kWh in 1996, more than ten times the world average), at the same time that it is the world's second largest exporter of petroleum.(1)

This means that energy development is a large part of the state's mandate, particularly so in a country where the utility companies are wholly owned by the government. Norway both produces and uses more energy per capita than almost any other country, and this accounts for a great deal of the extraordinary wealth created in Norway since the 1970s. Export sales of oil from Norway (sold by state-owned companies) accounted for nearly US\$7300 for every one of Norway's inhabitants in 1999.(2) At the same time, utility prices are kept artificially low. Norwegian costs per kilowatt hour of electricity are among the lowest in the world (approximately US\$0.02/kWh), even after recent reforms have changed price structuring and are supposedly more market based.(3) In order to maintain such policies, continual development of energy resources was deemed necessary. Any new electricity needs were

1. Norwegian Institute for Nature Research & Eastern Norway Research Institute. 2000. *The Glomma & Laagen Basin, Norway*. World Commission on Dams Case Study. 24 March 2000, p. 3.

2. Alexander's Gas and Oil Connections. 2000. "New Norway PM Stoltenberg names new young government." *New and Trends- Europe*. 5, 7, 27 April 2000.

3. Norwegian Institute for Nature Research, et.al. 2000, *op.cit.*, p. 4.

to be met with development of hydroelectric sources, as it has only been recently that Norway has considered using its fossil fuel reserves for power production.(4)

Another factor in the development of hydro projects in Norway was the north-south geography of the country. While covering an area of only 386,958 sq km (the same size as the US state of New Mexico), Norway's coastline stretches over 14 degrees of latitude (totalling over 21,925 km), and most of the population lives in the southern half of the country. Southern Norway is kept relatively warm due to its proximity to the Gulf Stream, and contains most of what little arable land exists in the country. The area north of Trondheim is more sparsely populated, and until quite recently most road and rail lines were unable to reach directly from the south. The geographic isolation meant that in order to travel from Oslo to Alta or Lindenes, one had to travel through Sweden and/or Finland.(5)

This has created a political north/south divide in the country, somewhat akin to what exists in Canada. With the centre of political power far to the south, both local and indigenous populations have had little interest representation. In fact, it was not until 1990 that Norway officially acknowledged that indigenous people lived within its borders.(6) Instead, Norway undertook a policy of infrastructure development in the

4. See Sigurd Aarvig. 1998. "Heat and Gas: The proposed construction of two gas-fuelled power plants has become a hotly debated issue in Norway." *Down to Earth Magazine*. 6, 22.

5. See Figure 2.

6. The relationship between the Norwegian government and the Sami people living within Norway has not been a terribly harmonious one. In 1958, Norway refused to sign
(continued...)

north, partly as a way to assert sovereignty over its 'distant' regions, the largest of which (Finmark) lies along the Russian border. For the most part, northerners accepted this view and were supporters of the Norwegian labour party, the political wing most closely associated with development projects. The Alta dam, first conceived as early as 1921, was to fit neatly into the constant progression of hydropower development in the northern reaches of the country. Such assumptions turned out to be terribly wrong, fostered by competing visions of science, politics and geography.

The Alta plans and local Sami

The Alta dam was under the jurisdiction of the Norwegian power development utility, the Norwegian Water Resources and Energy Administration (NVE), which started drawing up plans for construction of the Alta dam sometime in the early 1960s.⁽⁷⁾ The exact details of these plans were and remain sketchy, due to the secrecy afforded the government agencies undertaking such development plans. In fact, few documents now exist regarding the manner in which Alta was first considered prior to 1970. The first public knowledge of the plans happened by accident in the mid-1960s. Trygve Lund Guttormsen, a Sami teacher from the village of Masi, happened across maps of his village while in a regional engineering office in Narvik. These maps contained water markers

6.(...continued)

the ILO Convention 107 on indigenous and tribal populations, claiming that the country had none. It did not sign the convention until 1990.

7. NVE was known in Norwegian as Statskraftverkene, later renamed Statkraft, and is currently known as Norges vassdrags- og energidirektorat.

following the 300 metre-high contour lines near Masi, indicating plans for a massive reservoir in the area.(8)

The area around Masi (within Kautokeino *Kommune*, or county) and the adjoining counties of Alta and Karasjok, contain populations of the only indigenous peoples in Scandinavia, collectively known as the Sami (also sometimes called ‘Laplanders’). The Sami were originally a nomadic people living in the northern half of Scandinavia and the Kola peninsula of Russia, with a distinct language and an economy based upon pastoral reindeer herding. There were some tens of thousands of Sami living in Scandinavia and Russia, and most of those with close ties remaining to reindeer herding were in Finmark. Masi, although a small village of only 400 inhabitants, was one hundred percent Sami-speaking, and the area around the Alta River and Kautokeino was one of the last remaining areas of reindeer pastoralism in Norway.

Yet to hydro planners in Oslo, this area may well have seemed deserted. Not used for agriculture, the upper Alta River valley was not seen as connected to any particular way of life or holding any particular value. In the eyes of planners, it may well have been that the river valley would be valuable only if flooded to provide hydroelectric power. If a few people had to be moved they would be compensated, but this should not detract from the larger common good of a development project. To the eyes of NVE, the Alta River valley was essentially ‘empty’. As Oddbjørn Langlo stated in 1978, “All we are doing is

8. Øystein Dalland. 1997. “The Last Big Dam in Norway: Whose Victory?” in: *Dams as Aid*. Usher (ed.), London: Routledge, p. 43.

putting a dam in a narrow valley where no one ever goes.”(9) Unfortunately, such ideas did not sit well with those living in the area, and such feelings were not limited to a few individuals.

In 1969 reports surfaced that a number of people in Masi were being turned down for building permits from the county agricultural office, although they were being given no explanation for this refusal. Nothing was said by NVE until later in 1969, however, which (not coincidentally) was the first year in which the state mandated that development plans had to be made public. Not long after this law went into effect on 19 June, NVE announced that it had been making ‘preliminary’ plans for a massive dam and reservoir system in the Alta and Kautokeino countries of northern Norway. A dam would be built on the Alta River, flooding 40 kilometres along the river and several mountain plateaus, totalling an area of 75 square kilometres. In addition, the Sami villages of Masi and Mieron would be completely flooded, and water would be diverted from the Tana to the Alta. Aside from the Alta River valley itself, other important areas planned for flooding were Iesjavri and Joatkjavrit. As little farming exists in the region, the sole purpose of the dam would be for hydroelectric production, which was projected to cover future electrical needs for the northern areas of Finmark.(10)

9. Jan Peter Borring, et.al. 1981. *Alta i Bilder: 12 års kamp for Alta-Kautokeinovassdraget*. [Alta in Pictures: the 12 year struggle for the Alta-Kautokeino Waterway] Oslo: Pax forlag, p. 54.

10. A map of the area downstream of the dam is contained in Figure 3.

Growth of Opposition to Alta

The Alta plans provoked much more controversy than had been anticipated by government authorities. It is perhaps safe to say that if they had known beforehand, then the plans would never have been pursued at such length, and ultimately, great cost to the country. For a country which had long prided itself on a homogenous polity and general lack of acrimonious politics, the Alta case may have come as a bit of a shock. This was partly due, however, to the long-held assumptions shattered by the long debate. A number of political divisions, including the north-south divide, became pronounced and perhaps even exacerbated by the politics involved. The different parties to the dispute carried with them a number of different assumptions, even if they may have agreed or taken the same side in the end.

Many Norwegians generally assumed that they were environmentally friendly, and it may have been disconcerting to discover that this view may not have been entirely true.⁽¹¹⁾ For those who worked under the assumption that the Norwegian state was essentially benevolent and honest, the dealings of the NVE and its attempts to suppress information may have also been disquieting. Even for those who supported the Alta dam, as did the Supreme Court in the end, were often forced to admit that things had gone wrong and that neither science nor democracy were being well served. Norwegians also had maintained a belief that they were all essentially homogenous, that few to no

11. This problem still persists in Norway, albeit to a lesser degree. The debate over 'sustainable development' in Norway is a prime example of opposing sides both claiming an 'environmental' high ground in politics. See Chad Briggs. 2001. "Norway Powers Up: Construction of new electrical plants in Norway will violate the country's Kyoto commitments." *Alternatives*. 27, 2, pp. 5-6.

minorities lived within the borders. The admission that the Sami had a culture and language which was distinct and perhaps even contrary to Norwegians' ways of life, must have had some effect on the Norwegian psyche. Such assumptions were all challenged because of the number of opposing factions within the Alta dispute. Several domestic and international groups opposed the project.

The first such group was the Sami. As a largely unacknowledged indigenous group living within Norway, the Sami felt threatened by the damages which the project might well bring to local life and the Sami identity. It is important to note, however, that Alta was not the first case in which the Sami were unhappy about a hydro-project being built in Finmark. NVE already had a good deal of experience in developing dams and reservoirs in the region, many of which interfered with Sami life. Many Sami did not share the desire for industrial growth held by those in the development agencies, at least not if it would come at the expense of identity. The village and Masi and the large reindeer herds of the region constituted important factors in such identity, notions not shared by NVE or those in the region who favoured construction. It is perhaps notable that of all the groups in the Alta case, the Sami were the most unified in their stance. No significant numbers of Sami ever opposed the project, and their support was crucial to the events to come.

International and national actors also played an important, if secondary, role early on in the planning. In addition to the problems with Masi, flooding of Iesjarvi would require water withdrawals from the Tana River, which forms part of Norway's border with Finland. After mounting international pressure and official protests from Finland, in

1976 NVE agreed to drop the plans for Iesjavri. Like the World Court Danube dispute between Hungary and Slovakia, diversion of a river which forms an international boundary was considered unacceptable, or at the very least of questionable legality. Other international actors included the International Union for Conservation of Nature (IUCN) and the World Council of Indigenous Peoples (WCIP). The WCIP stated its concern that the Alta dam project, like so many before it in various countries, would discriminate against the Sami because the effects upon their culture was so poorly understood (or ignored) by authorities in Oslo. The IUCN attempted to bring international pressure upon the Norwegian government to prevent flooding of an ecologically sensitive region.

The efforts of the IUCN were mirrored in Norway itself by a number of environmental groups. 1975 saw the first official protests from such non-governmental groups, when Norwegian Friends of the Earth (Naturvernforbund, or NFB) filed a complaint with the Norwegian Storting's Ombudsman for Public Administration.⁽¹²⁾ NFB claimed that errors in early drafts of the planning process required the Alta dam case to be reconsidered, and that it should not be given legislative approval.⁽¹³⁾ This was the first point at which a Norwegian national organization had become involved in the controversy, and the NFB was to play a major role throughout the rest of the conflict. NFB was not only concerned about the effects of the Alta plan itself, but wanted to improve the political process by which such projects were considered. Many

12. The Norwegian Storting is the national parliament, which acts (as in a Westminster system of government) as the sovereign body under the Norwegian Crown. Administrative agencies, such as NVE, act under control of the Storting.

13. Borring, et.al. 1981, *op.cit.*, p. 20.

environmentalists wanted to require the state to produce environmental impact statements (at the start of the Alta case, only the United States had such legislation), and to require freedom of information (again, the US enacted the first of such laws in 1975). Yet Norway was a system under which the Storting had ultimate apparent control, while NVE operated independently and with the support of parliamentary members. There was neither any tradition of judicial activism in the country, nor a strong tradition of public input in technical matters.

1975 was also the first year in which local, non-Sami populations voiced official objections to the plans. The municipal governments of Alta and Kautokeino voted against the plan, the first time in Norwegian history in which a local government attempted to veto the actions of the state. The northern reaches of Norway had always maintained a more radical edge to politics than the rest of the country (and Norway was somewhat left-leaning, to begin with), so it may not have been quite as unusual for vocal protests to originate in that area.⁽¹⁴⁾ Areas such as Alta and Kautokeino had grown used to some measure of autonomy from Oslo, as the great distances and lack of regular travel routes between the two areas kept state policies at a distance. Up until the 1970s, there had been growing unease among some local residents regarding NVE's growing presence in the area, coupled with growing NATO activity. It is possible that the plans for Alta were what broke the camel's back, so to speak, as it aroused increased feelings of resistance

14. See the work of Kari Heitmann. 1984. *Alta-saken og Altaværingene: Sosial identitet og politisk konflikt*. [The Alta-saga and the fate of Alta: social identity and political conflict] Hovedoppgave ved Institute for sosial-antropologi, universitet i Oslo: høsten 1984.

and resentment.

Although both the Labour and Conservative parties supported the project, it was the Labour party which contained the most fervent proponents. As most of Alta-Kautokeino voted Labour in the elections, this caused a split in party loyalty. Many felt that the national government should be obeyed in its wishes to build the dam, while others viewed the project as illegal interference in the region. The Alta case aroused bitter feelings among friends, neighbours and spouses, and it is reported that lingering feelings still persist today.⁽¹⁵⁾ The existence of animosity was at least partly because the controversy did not run along the more traditional functional lines in Norwegian politics, where the basis for opposition would be motivated by ideological factors. Certainly, this was the case for some environmental groups, but for the local populations in the Alta region it was more a matter of centre versus periphery in political administration.⁽¹⁶⁾

For a case such as Alta, where the environmental and social effects would be felt entirely by local populations, and where benefits were not clearly visible⁽¹⁷⁾, local opposition to central authority is more likely. In addition, not only did Alta have a history of radical/left politics, but the prospect of the Norwegian state 'stealing' the river aroused memories of resistance to WWII. Germans occupied Alta during the war, and burned it to the ground while retreating from Soviet forces in 1945. It is interesting that a number of

15. Reports of lingering feelings were reported by all those interviewed in the Alta area in 2000.

16. See the analysis in Svein S. Andersen and Atle Midttun. 1985. "Conflict and Local Mobilization: The Alta Hydropower Project." *Acta Sociologica*. 28, 4, pp. 317-335.

17. The energy forecasts for Alta are discussed in more detail below.

the local opposition leaders were veterans from the war, some of whom lived in the Alta valley as guerilla fighters during the German occupation. A number of sources have mentioned the importance of resistance during the war to those protesters, and quoted one as saying, "The Germans could ruin our homes and leave them in ashes, but they could never take the river from us!"(18)

The central administration, particularly the NVE, was not particularly adept at dealing with such a situation. In the face of questions regarding the state's legitimacy to undertake such a project, the Storting and NVE undertook a process of attempting to both coerce protesters to give up their struggle, as well as attempting to control the terms and content of debate and information. The scientific reports associated with the Alta dam, detailing both environmental and social impacts, were systematically suppressed and/or altered to shore up the state's flagging legitimacy and justifications for construction. In the end, the government would all but admit that its policies regarding research had not only been unscientific, but illegal.

Short History of Events Leading to Construction at Alta

The prospect of flooding two Sami villages caused enormous unrest in Alta and Kautokeino counties when the news was announced, and the indigenous Sami protested visits by NVE and state authorities. These actions attracted attention from both the Norwegian and international press, perhaps as much for their timing as the actions,

18. As quoted in Georg Parmann. 1981. "Lydig eller ulydig mot Alta-utbyggingen?" [Obedience or disobedience toward the Alta Project?] in : *Den Vanskelige Ulydigheten*. Oslo: Pax Forlag, p. 84.

themselves. By the time the Sami were protesting the dam proposal in 1970, it was the same year as the first European Year for Conservation in Norway, the year of the first Earth Day celebrations, and the same year in which the Norwegian government was announcing plans for a program to combat housing difficulties among the Sami. The notion of flooding entire Sami villages at the same time the state spoke of environmental awareness and helping to combat Sami housing problems, contained far too many contradictions to go unnoticed. Parliamentary protests led the Storting to declare Masi a heritage area in 1973, forcing NVE to drop its plans to flood the village. And as mentioned previously, in 1976 plans to flood the Iesjavri were abandoned due to international pressure.

The government scaled back the proposed project from 1400 to 625 Gwh, limited the impoundments to one 110-metre dam on the Alta River (originally, two dams were to be built), and created only one reservoir on the system. This revised version of the project was passed in the Storting in 1978, over the objections of two municipal votes against construction in Alta and Kautokeino counties. The following year, lawsuits began to be filed against construction, prompting the Storting to once again legislate construction of the project (this was a highly unusual step). Access roads for construction had already begun to be built before legislation was ready, indicating that the pro-dam lobby was not likely to relent on its plans to build the remaining Alta dam structures. The construction resulted, in summer 1979, in a summer 'resistance camp' set up at Alta, a group of several thousand protesters from all over Norway and Europe, loosely organized under the People's Action (Folke-aksjonen) group of local Alta opponents.

The project was truly put into the spotlight, however, when on October 5th of that year several Sami erected a tent (lavvo- similar to a Native American teepee) on the grounds in front of the Storting, and began a hunger strike against the dam. These eight young men and women stayed despite repeated attempts by the police to remove them, and their presence created quite a media stir. Conflict was further exacerbated when a Sami lawyer and activist, Leif Dunfjell, claimed that the actions of NVE were illegal, since they had not given the Sami proper notice of their proposed actions.⁽¹⁹⁾ By 15 October, Prime Minister Oddvar Nordli announced a six-week halt in the construction plans, pending review of its legal status and perhaps its political acceptability.

The delay stretched out to over a year, as internal debates in the Labour party took place and the case was argued in the media and courts. Two court cases, in particular, were filed in the Alta municipal court. One was filed by the state, and concerned compensations measures for the project, while the NFB quickly followed by a suit brought against the state for illegalities in the way in which the Storting's resolution was passed concerning Alta. This was the first time in which a parliamentary decision on an environmental matter had ever been contested in a Norwegian court, and it was the first time that a group such as NFB was granted legal standing to bring such a suit against the state. What is most interesting in the context of this research is that the claim made by the environmental groups and local opponents was that the Storting's decision was void because of "procedural errors and because it is based on false and inadequate factual

19. See Dalland. 1997, *op.cit.*, p. 45.

assumptions.”(20)

In the court of appeal ruling on 5 December 1980, the court ruled 4-3 in favour of the government. Although a majority ruled in favour of the state, the majority decision still made reference to shortcomings by administrative officials, claiming only that such decisions may not be concrete or may be beyond the jurisdictional review of the court.

They also note a number of concrete issues where they consider the executive work faulty and inadequate. But, however critical to a number of aspects of the project procedure, the majority concluded that ‘the faults and shortcomings present in the [administrative] work and background information, would not have influenced the approval of river regulation and development of the Alta river.’(21)

The court’s conclusion will be examined again below, in considering the influence of anti-scientific processes in the administrative planning. What is perhaps most notable at this point was that such processes were already highly visible to many, and very nearly confirmed by the Norwegian courts. But matters were to grow worse, and never really to improve again with the Alta case.

The delay called by Nordli had split the national Labour party, with moderates like Nordli coming under fire from dam proponents like oil and energy minister Bjartmar Gjerde. By January 1981 Nordli was removed from power by his own party, to be replaced by the young environment minister, Gro Harlem Brundtland. Her government moved quickly to reinstate construction plans in January, and in a much publicized move, refused to speak with relatives of Samis who once again went on a hunger strike. Further,

20. As quoted in Erik Høines. 1999. *Court Cases in Dam Projects*. Oslo: FIVAS, p. 16.

21. *Ibid.*, p. 18.

she ordered national police to move into the area of Alta, rather than allowing local police to handle protesters, as had been the case in 1979. The result was the largest police mobilization in Norway since WWII, with 600 police (or about ten percent of the national police force) moved into the area by military transport. Military vehicles were even repainted and move illegally through Sweden and Finland, a fact which did not sit well with those governments after it had been discovered.(22) A second protest camp had been set up near Alta, despite the winter conditions, but police soon moved in and arrested up to 1000 people at a time. The police were stationed aboard a large ship which remained moored in Alta harbor, and stayed there throughout the winter.

In early February the government once again halted construction of the access road (between Alta and Stilla, and the site of most civil disobedience), a delay which lasted until autumn. Construction started up again in September 1981, only to be met by yet a third protest camp. These protesters remained throughout the winter, countered by a second ship of 400 police reinforcements. Because of the massive power brought to bear against the protesters, and because of the final Supreme Court ruling in 1982, the People's Action against the dam finally relented and construction of the dam continued. It was finally completed in 1987.

22. Several years later, the Norwegian Supreme Court would conclude that the military had overstepped its bounds by interfering in civilian matters. See Dalland. 1997, *op.cit.*, p. 46.

The Economics of the Alta Dam

Like the Bős-Nagymaros or Animas-La Plata projects, one of the most questionable areas of research and information in Alta remained the cost-benefit analysis. It was not only the impetus for many to begin investigating the dam's worthiness, but it was also (by 1992) the first area in which the utilities had to admit wrongdoing and serious error. It was in that year that the Finmark County (Fylke) Energy Corporation admitted that it was not able to pay its plant loans, opting instead to sell its shares in the project to the state. This was due not to gross financial mismanagement, but rather reflected the large surplus of energy in northern Norway, a surplus which NVE claimed would never occur.

Rather, they claimed that the Alta project was needed to avert deficits in energy production, even though NVE itself knew otherwise. As the project's unofficial historian, Øystein Dalland, wrote,

...perhaps the greatest tragedy of the Alta controversy was that the energy produced there was never needed, a fact that project proponents knew but covered up until construction was well underway. The national energy prognoses, showing power surpluses in the North ten years ahead, were deliberately not published by the then Energy Minister Bjartmar Gjerde. This was crucial for the final government order to start the construction work. Yet when the plant was opened in 1987, the authorities admitted that even in dry years northern Norway would have an energy surplus of 600 Gwh, which was twice the estimate of Alta's winter power production available for transmission to southern Norway.(23)

These basic facts and admissions underlie one of the most troubling areas of censorship

23. Dalland. 1996, *op.cit.*, p. 47.

and data fraud in the Alta case- the economic justifications for the dam.

The Assumed Need for Electricity

The original plans for Alta were justified on two assumptions: that power was needed in northern Norway, and that the Alta hydro plant was the best way to achieve that goal. The first assumption, as mentioned, was based upon faulty evidence and was later supported by fraud on the part of NVE, yet some further explanation is necessary regarding the energy forecasts. Because of Norway's geography, it was both difficult and expensive to build power transmission lines between southern and northern Norway. Until the 1980s, whatever power could not be produced within northern Norway had to be imported from Sweden or Finland, and there were costs associated with Norway transmitting its own power through the other countries. NVE claimed that the best way to achieve self-sufficiency of the northern parts of Norway would be to construct power plants in that area.

The original forecasts used by NVE claimed that Finmark would experience a steady rise in power demand, and since electricity could not easily be transmitted from southern Norway (where there would be a surplus), the Alta development was necessary. It is important to note that, had power lines (or plans for such lines) existed between southern and northern Norway, then the Alta project would not be necessary. This is important precisely because the power lines were being planned. *Miljømagasinet* (The Environment Journal) reported as early as 1978, NVE has lowered its estimates on power consumption, although NVE failed to pass such information to the Storting in its

deliberations. Furthermore, *BergensTidene* (The Bergen Times) reported that NVE had given the Storting misleading information regarding plans to build power transmission lines between southern and northern Norway.(24)

Ironically it was 1987, the same year in which construction of the Alta dam was completed, in which Finmark started to experience a power surplus. In fact, Finmark has not increased its power consumption appreciably between 1980 and 2000, certainly not in relation to the amount of electricity now available in the area.(25) A substantial surplus now exists in the northern part of the country, and Norway in general has experienced record electricity surpluses. Norway is already the highest per capita user of electricity in the world, and in 1999 Norway had a 20% production surplus above that level, equal to some 32 Alta power stations.(26) Even so, Norway continues to press for further development of energy, although water development restrictions put into place in the early 1990s have shifted debate into the possibility (or necessity) of producing natural gas-fired plants. Throughout all these debates, the consideration that energy conservation may have negated the need for extra power production does not appear in any NVE calculations, and has been consistently dismissed as a criticism of their 'scientific' analyses.

24. Borring, et.al. 1981, *op.cit.*, p. 143.

25. Erling Diesen. 1998. "Forutsetninger for Altautbyggingen: Kraft." [Background for Development of the Alta: Power] in: *Altalaksen: Kultur, kraftutbygging, og livsmiljø*. Næsje (ed.), Alta, Norway: Alta Kommune, p. 38.

26. Audun Garberg. 2000. "32 Alta-kraftverk fra himmelen. [32 Alta-powerstations from heaven] *Natur & Miljø Bulletin*. 22.

The Assumption that Alta was the Best Alternative

The second assumption used in justifying Alta, that the hydropower project was the best way to achieve the goal of increased production, was also doubtful. Support of this assumption relied upon determining that the hydro-project was more cost efficient than alternative plants, as well as showing that the costs of constructing the plants would not outweigh the benefits of electricity. That Alta was a better investment than alternative power plants was not a foregone conclusion. The role of a reserve power plant could have been achieved through construction of small natural gas-fired plants, and since the 1970s, Norway has had one of the largest natural gas supplies in the world. Suggestions were made by local opposition to this effects as early as 1970(27), yet considerations of alternatives to Alta were only posed in terms of what kind of dam to build, and where to build it.

NVE's 1974 assessment makes it quite clear that the only considerations in terms of cost-benefit were construction costs compared to the income from electricity. No other possible considerations were even given mention in the report.(28) In 1980 the Norwegian courts ruled that NVE had, in fact, supplied misleading information to the Storting regarding possible alternatives to the Alta dam. Apparently NVE had mentioned the possibility of using gas turbines at one point, but argued that they were less secure

27. See Statskraftverkene (NVE). 1976. *Alta-Utbyggingen: Ajourført søknad av mars 1976*. [Alta Development: Ajourført inquiry of March 1976] Oslo: NVE, p. 13.

28. Statskraftverkene (NVE). 1974. *Alta-Utbyggingen: Sautso Kraftverk Plan av april 1974*. [Alta-Development: Sautso Powerplant plan of April 1974] Oslo: NVE.

than hydro plants. NVE then used that argument to raise visible costs to the project, while at the same time removing gas plants from consideration (a form of bookkeeping fraud).(29) Although the court still ruled that this did not violate the project's legality, events at the same time created an absurd twist to considerations of cost-benefit analyses.

The constant police presence in Finmark and Alta was costing the government upwards of one to two million Norwegian kroner every day (5 NOK= 1 USD) during the height of the protests. This meant that the state's effort to enforce construction by itself cost as much as building several gas-fired power plants. The Norwegian government's insistence upon building the dam in the face of repeated protests meant that the monetary costs of the project were far higher than projected, and certainly much higher than for what locals would have considered more acceptable alternatives. By this time, however, it seemed a matter of principle that the dam should be built, regardless of the costs or consequences. As far as the national government was concerned, small municipalities should not have the right or ability to veto large development projects. One member of the Storting reportedly told journalist Jan Peter Borring, "I don't care if that dam never produces a single kilowatt-hour of electricity, I'm still voting for it."(30)

Environmental/Social Effects of the Alta Dam

The environmental and social effects of the Alta dam were felt very much as they

29. Author's interview with Jan Peter Borring, Oslo, Norway, 6 September 2000.

30. Borring. 2000, *op.cit.*

had been predicted. The protests over initial plans to flood areas containing the villages of Masi and Mieron prevented many of the possible problems which a larger project would have produced, as the existing Alta reservoir covers an area merely four percent of what the original plans called for. Yet the damage to reindeer, salmon, farming and changes in local climate have occurred in accordance with ecological predictions made in the early 1980s. These damages will be examined according to both forecasts made in the early 1980s, and follow-on studies and experiences of those living in the Alta area. It will then be possible to ask why, providing that NVE and the Norwegian government knew that such damages were possible, did they insist upon construction of the Alta project?

Reindeer Herding

In 1981, the Norwegian Supreme Court requested that an American anthropologist, Robert Paine, prepare a report on the possible consequences of the Alta dam upon the lives and culture of the Sami.⁽³¹⁾ Prior to this time, no systematic investigation had been undertaken with regards to the impact of the dam upon Sami way of life. NVE assessments had relied upon certain restriction evaluations (described below) on reindeer. But as initial plans for the Alta project had included flooding Masi village, cultural or social considerations were not likely high on their list of priorities. However, not only the villages which were at risk. Paine worked from the premise that the environmental effects upon reindeer could not be separated from the social impact of the

31. Robert Paine. 1982. *Dam a River, Damn a People?: Saami (Lapp) Livelihood and the Alta/Kautokeino Hydro-electric Project and the Norwegian Parliament*. Copenhagen: IWGIA.

dam upon the Sami. And as up to tens of thousands of reindeer would be directly or indirectly affected by the dam project, so too would Sami identity.

As Paine described the conditions at the time,

Logistically, Saami reindeer management in Finmark is an impressive operation; at first sight it is even bewildering: some 200 families tend 100,000+ animals in an area the size of Denmark, and each spring herds and herdsman move to the coast (peninsulas and islands) and then back again in the autumn, deep into the tundra. Migration routes are up to over 200 kilometres.(32)

The Alta River basin was central to many of the migratory routes he described, and it is easy to understand why the Sami were upset at the idea of more intrusion onto reindeer herding grounds. The Iesjarvi basin, which was to be flooded under the original Alta plans, was central to the migratory routes of some 40,000 reindeer. These reindeer migrated along fairly set pathways (drumlin swarms), and it was feared that even modest changes in the water level would cause disruption by flooding and causing ice blockage of migratory paths.(33)

Reindeer are affected by the dam in a number of ways, both directly and indirectly. The most obvious direct effect is the flooding of land used by reindeer, which forces them to move out of the area and possibly into unsustainable land (particularly as most areas upstream of the Alta dam are tundra, and therefore only able to support limited numbers). This was a serious consideration under the first Alta plans, which in the early 1970s included Iesjavri and a total reservoir area of 75 square kilometres. Once the

32. *Ibid.*, p. 10.

33. Dalland. 1997, *op.cit.*, p. 44.

project was scaled back to cover an area of only 2.8 square kilometres, it was thought by NVE that damage to reindeer would have been seriously diminished. Unfortunately, the areas which would be flooded were crucial to spring calving for migratory reindeer, especially as previous development projects had already reduced the areas of suitable land for such purposes. As the Alta Court of Appraisal stated in 1980,

The direct consequences of regulating the water level in Vird'nejav'ri will be the destruction of reindeer pasture. The area that will be affected is not large but it is all-important as it is part of the precious, because scarce, spring pasture. It is unlikely that the loss can be made good— for there [are] no other spring pastures to be found.(34)

Although it might have been true that direct damage by flooding may have been lessened, the indirect effects were still very important. The reservoir eventually built at Alta stretches for several kilometres through what was once a narrow valley, and the dam required that several long utility roads be built in order for service. These created new obstacles for migratory reindeer, who are often more easily spooked by new disturbances than non-migratory sorts. The longest road (Stilla), which stretches 36 kilometres over forest and tundra, creates a barrier to migration and allows greater access to interior lands in which the reindeer live. Power transmission lines from Alta also interfere with wildlife in the area, but were never even shown on NVE planning maps.

An NVE sponsored report concluded in 1974 that implementation of the contemporary plans would have 'catastrophic' effects on the reindeer of the area, even

34. As quoted in Paine. 1982, *op.cit*, p. 35.

though the original planning procedures did not take migratory reindeer into account.⁽³⁵⁾ The 1974 report helped to exclude Iesjavri from the catchment area, but procedures for assessing damage to reindeer nearer to Alta remained the same. In fact, that same year NVE applied to the Storting for exemptions from its (then already limited) assessment requirements, claiming that it should not have to take account of reindeer herding, salmon fisheries, and natural resources in the area. Although this request was officially turned down, NVE continued with such a policy, nonetheless.

According to NVE, damage to reindeer pastoralism was considered only in terms of direct damage to flooded pasture and the number of reindeer living in the immediate area. It did not take into account the effects of flooded pasture upon migratory routes, nor the effects of secondary infrastructure (such as roads) upon migration routes or the rather fragile tundra ecosystem.⁽³⁶⁾ Accordingly, the early planning and parliamentary debates refused to acknowledge any damage to reindeer in the area. As few lived in the region year-round, up to several thousand reindeer in the Alta-Kautokeino region were systematically excluded from consideration. This led to statements such as those made by oil and energy minister Bjartmar Gjerde when he testified in 1979 that only 21 reindeer

35. See A. Baer, O.K. Haetta and L. Villmo. 1974. *Skader og ulemper for reindriften ved en eventuell regulering og utbygging av Altaelva, Joat'kajavr'it med overføring av Tverrelva, samt Jiešjav'ri*. [Damages and disadvantages for reindeer herding due to proposed regulation and development of the Alta River, Joatkajavrit with transfers from the Tverr River plus Iesjavri] Oslo: NVE.

36. Paine. 1982, *op.cit*, p. 4.

would be affected by the project.(37) The actual number was much closer to 30,000.(38)

The NVE impact assessments concerning Alta initially claimed that specific impacts on reindeer would be impossible to predict. As they would be impossible to predict, NVE argued that they should therefore be of little concern. Yet curiously, the assessment then goes on to say that through the formation of a reservoir at Alta, there would be increased vegetation around the shore, which would be of benefit to reindeer.(39) This ambivalence regarding the fate of reindeer in areas adjacent to Alta is indicative of NVE's and the Norwegian government's desire to imagine the Alta-Kautokeino region as empty, useful as an energy resource. Although numerous reports existed between 1974 and the early 1980s regarding the impact of Alta on reindeer, NVE continually ignored such reports in favour of its original decision and information, however faulty it may have been.(40) The problem was not that information was not available, it was that NVE and the Storting chose not to consider it.

Finally, the social effects of the dam upon the Sami were significant. Although only a fairly small percentage of Sami living in Alta-Kautokeino were actively involved

37. Georg Parmann. 1980. *Kampen om Alta: en trusel mot vårt demokrati?* [The conflict with Alta: a threat to our democracy?] Oslo: Dreyers Forlag, p. 60.

38. Øystein Dalland. 1981. *The Alta Case: Learning from Errors in a Human Ecological Conflict in Norway?* Bø, Norway: Telemark Distrikthøgskole, p. 8.

39. Excerpts from such NVE reports, many of which were otherwise impossible to obtain, were collected within Parmann. 1980, *op.cit.*

40. For an overview of the reports produced during this time, see P.J. Tømmerraas. 1991. *Viltundersøkelser i Altavassdraget. Oppsummering 1982-90.* [Wildlife research along the Alta River: summing up the period 1982-90] NINA Oppdragsmelding 081, pp.1-23.

in reindeer pastoralism, its existence and persistence from pre-Viking times provided a form of identity distinct from the Norwegian culture. By endangering one of the last viable migratory areas for reindeer in the north, the Alta dam threatened this identity.(41) Such damage is, of course, difficult or impossible to quantify. Yet the persistent opposition of the Sami to the project, the reports from Sami themselves regarding the importance of the river and surrounding lands, made clear that the Alta project was considered an intrusion into Sami and local ways of life.(42)

Threats to Salmon in the Alta River

The Sami were not the only local residents concerned about the dam. For many local Norwegians, one of the overriding issues to prompt concern was the fate of salmon in the Alta. Alta has been credited with having some of the best salmon stocks in the world, and early Norwegian anglers were amazed to find salmon weighing up to 35 kilograms. They drew tourists and anglers from around the world, and were a source of pride among locals who had fishing rights to the river.(43) Such has been the history and pride associated with the salmon in Alta, that it is argued that this issue alone accounted

41. Plans to flood Sami villages did not help, either.

42. For a short history of such values, see Kari Heitmann. 1998. "Altaelvas betydning for lokalsamfunnet." [The Alta River's meaning for local populations] in: *Altalaksen: Kultur, kraftutbygging, og livsmiljø*. Næsje (ed.), Alta, Norway: Alta Kommune, pp. 26-32.

43. Jens Petter Nielson. 1998. "Laksefisket i Altaelva i historisk perspektiv." [Salmon fisheries of the Alta River in historical perspective] in: *Altalaksen: Kultur, kraftutbygging, og livsmiljø*. Næsje (ed.), Alta, Norway: Alta Kommune, pp. 10-19.

for the great discrepancy in support for the dam between the Alta river valley and Tverr river valley. Those living near the Tverr River had settled in the area later than those near the Alta, and therefore did not have traditional fishing rights in the Alta River. Many in Alta argued that this is the reason why most in Alta opposed the project, while most in Tverr either supported the dam or at least did not oppose it.

As most large dams around the world, the obstruction of the normal waterway cuts off wildlife between upstream and downstream habitats. For no one creature has this been of more concern than with salmon, whose spawning activities demand that they must be able to swim upstream from the ocean every few years. Failure to do so will inevitably cause a crash in salmon populations in the area, as the fish are remarkably specific as to which river and stream they must return; they will not choose alternatives.⁽⁴⁴⁾ Dams blocking salmon migratory routes are a source of immense controversy in New England and the Pacific Northwest of the US and Canada, and has prompted dams to either be removed (as in Maine) or proposals have been made for their removal (as with, for example, the Snake River in Washington and British Columbia).

Fish ladders can mitigate effects, but there will always be a loss associated with spawning salmon using ladders rather than natural river runs. More problematic is that salmon fry swimming to the coast are often killed when taken into the turbines or sluice gates, or become disoriented in the thermally static reservoir and never travel past the dam (which is quickly fatal). Even if salmon manage to navigate the dam successfully,

44. See J.H. Mundie. 1991. "Overview of effects of Pacific coast river regulation on salmonids and the opportunities for mitigation." *American Fisheries Society Symposium*. 10, pp. 1-11.

changes in water temperature caused by the dam can prevent successful spawning. Salmon must spawn in particular temperatures, and since they only choose specific locations in which to spawn, changes in water temperature can prove fatal to salmon fry. Questions regarding the specific effects of Alta on salmon in the area went unanswered by NVE, even while other researchers pointed out that too much uncertainty existed for NVE to claim that no significant damage would be done.⁽⁴⁵⁾

Another mitigating solution, and one used in Alta, is to attempt to produce salmon in fisheries. This has allowed the Alta River to maintain a certain level of salmon in the river, but biologists and ecologists in other parts of the world have expressed concern that hatchery salmon may dilute the genetic stock of the larger population.⁽⁴⁶⁾ As breeding techniques are entirely different between hatcheries and the wild, the hatcheries are an environment in which diseases are more easily spread and natural selection fails to take place on the extreme scale to which natural salmon fry are subjected. These are fairly recent studies, however, and it is not likely that researchers in the 1980s would have been aware of the possible dangers at the time. Both anecdotal and scientific reports have

45. Again, see Tømmerraas. 1991, *op.cit.*

46. These concerns have existed among scientists since at least the 1970s. See John H. Helle. 1976. "Genetic considerations for salmonid aquaculture: biological uncertainties." in : *Proceedings of the Conference on Salmon Aquaculture and the Alaskan Fishing Community*. Rosenberg (ed.), University of Alaska Sea Grant Program. Sea Grant Report. 76, 2, pp. 171-190. Also Craig A. Busack and Kenneth P. Currens. 1995. 'Genetic risks and hazards in hatchery operations: fundamental concepts and issues.' *American Fisheries Society Symposium*. 15, pp. 71-80.

backed up what was initially feared by local residents regarding salmon.(47) The average age and size of salmon in the river have decreased, and with the disappearance of larger salmon have gone the wealthy tourists who once travelled to Alta for the purpose of trying to find them.

Yet for NVE, the question of salmon was not a major consideration. The original 1974 assessment report did not contain any mention of negative impacts upon salmon, arguing instead that any effects could be effectively mitigated. As NVE wrote,

With comparatively reasonable restrictions on operation of the power station, we believe that there will not arise any marked alterations for fish or fish populations in the river.(48)

NVE did not describe in detail what such 'restrictions' would be, nor why they could compensate for a river impoundment. Rather, the question was largely avoided, and no mention of salmon was made when public hearings were held in 1974. Later reports were likewise ignored or suppressed. One reported incident involved a fisheries researcher whose conclusion that the Alta dam would harm salmon, was cut out of the report by NVE because it was claimed that any such 'opinions' were outside his mandate.(49)

NVE was not specifically to blame for any distortions regarding the science of salmon in the Alta. In addition to direct censorship or suppression of findings by the

47. Laila Saksgård, Tor F. Næsje, Torbjørn Forseth, Tor G. Heggberget. 1998. "Er laksen i ferd med å forsvinne?" [Are the salmon about to disappear?] in: *Altalaksen: Kultur, kraftutbygging, og livsmiljø*. Næsje (ed.), Alta, Norway: Alta Kommune, pp.117-130.

48. Statskraftverkene (NVE). 1974, *op.cit.*, p. 39.

49. Borring. 2000, *op.cit.*

government, fisheries scientists themselves have often shared blame for minimization of risks to salmon and the promise that any adverse effects of dams can be mitigated. This has been as true in Norway as in the US and Canada, where pisciculture experts have long advocated fish hatcheries (salmon hatcheries in the US date back to the early 20th century). As Matthew Campbell writes in relation to the problem in North America,

Fishery scientists have directly contributed to the lack of adequate response to salmon decline and in some cases directly contributed to further declines by becoming overly invested in "quick fix" solutions, especially fish hatcheries. Many fisheries scientists have uncritically accepted the role of technologists, championing technological solutions. Then, they repeatedly assured the public and the special interests that science can control nature and provide large numbers of fish. Thus, the real problems posed by dam passage, over-fishing, and habitat loss and destruction are minimized and not addressed.(50)

The problem, as will be discussed again below, is an institutional atmosphere which does not accept criticism, and may interpret competing evidence as injurious to its existence. Despite evidence of declining salmon populations despite hatchery programs, despite the high cost of the programs (in Canada, it costs upwards of \$400 to produce one mature chinook salmon), nothing should question the project's viability.(51)

Other Factors- Erosion and Local Climate

Two other major concerns raised during the planning stage of the Alta dam were

50. Matthew Campbell. 2001. *The Science of Salmon Recovery in the Columbia River Basin*. (Downloaded from <http://www.environwest.uidaho.edu/> 19 January 2001)

51. For discussion of the high costs of hatchery salmon, see J. Winton and R. Hilborn. 1994. "Lessons from supplementation of chinook salmon in British Columbia." *North American Journal of Fisheries Management*. 14, pp.1-13.

possible erosion and changes to the local climate. The geology of the area made it fortunate that selenium or mercury contamination from the reservoir would not be a concern(52), but the Alta-Kautokeino region was not blessed with large amounts of arable land. Of course, few areas in Norway have much land which can be farmed (in total, only three percent of the country), but arctic conditions and short summers make areas north of the Arctic Circle ever more marginal. For this reason, concerns about climate and erosion have a special significance, as they prompted farmers to oppose the dam in significant numbers.

Erosion is a constant problem with dams, as river impoundments catch silt flowing down the river and cause 'hungry' water to flow downstream. 'Hungry' water refers to water with a low nutrient/mineral load, which attempts to regain that load by eroding material downstream of the dam.(53) As a result, construction of dams always increases erosion rates downstream, often significantly, and this may cause destruction of farmland near the river. River banks may widen, the river bottom may deepen, and silt within the river itself may be carried downstream.(54) In addition, dams prevent normal flooding of flood plains, and so also prevent the deposition of sediments and nutrients in these areas. In countries such as Egypt, this has caused severe problems with maintaining

52. See the chapter on the Animas-La Plata project for discussion of these problems.

53. Patrick McCully. 1998. *Silenced Rivers*. London: Zed Books, pp. 33-36.

54. See, for example, US Geologic Survey. 1999. *Geomorphic Effects of Overflow Dams on the Lower Neosho River, Kansas*. Water-Resources Investigations Report 99-4147. Also Cambodian Fisheries Office, Ratanakiri Province. 2000. *A Study of the Downstream Impacts of the Yali Falls Dam in the Se San River Province, Ratanakiri Province, northeast Cambodia*. May 29, 2000. (Downloaded from <http://www.cambodiakorps.org/>)

farmland near the Nile, and it was reported as early as the late 1970s that similar problems may occur at Alta.⁽⁵⁵⁾ The loss of silt in the river itself also exacerbates damage to fish populations, as 'clean' rivers are not as habitable to fish and fish spawning as those which preserve sediment.

The phenomenon of downstream erosion has been well known for many years, and it is extraordinarily unlikely that an organization with the amount of dam-building experience as NVE would not be aware of this information. Yet the 1974 assessment did not mention any possible impacts of the dam upon the farming industry. It was not that the report failed to mention farming, but rather it stated quite plainly that farming was simply not a consideration in the decision to build the dam.⁽⁵⁶⁾ Presumably, then, the knowledge of possible erosion of farmland near the river (and much of the farmland in Alta lies, predictably, near the river) was simply ignored, despite any damage that might occur. This willful ignorance was rather odd for Norway, a country which provides substantial subsidies to farmers who are willing to live and work on small farms in marginal areas.

The importance of farming was brought to the attention of NVE in the early and mid-1970s. The conservation group Finmarks Naturvern cited in a written statement to NVE in August 1970 that farming had primary importance in the concern of its members, followed by reindeer herding and fishing. They went on to write that alternative means of power production need to be considered, in light of possible damage to "farming,

55. Borring, et.al. 1981, *op.cit.*, p. 143.

56. Statskraftverkene (NVE). 1974, *op.cit.*, p. 39.

reindeer, fish, hunting and meteorological concerns.”(57)

Although not a common impact of dam construction, the possible effects to local climate around Alta-Kautokeino were of concern to local Norwegians and Sami. It was feared that the construction of a reservoir would create a cooling effect in the immediate area, particularly with the larger reservoir initially planned in the 1960s and early 1970s. The Alta region would be particularly susceptible to such changes. As one of the northmost cities in the world, Alta is protected from North Sea storms by a low circle of mountains extending to the harbour entrance, while still enjoying the relative warmth of the Gulf Stream. Even fifteen kilometres inland, however, the climate changes and begins to turn to tundra and arctic conditions. The Alta reservoir threatened to cool the Alta valley further, changing conditions for farming (which already enjoyed only a short season) and wildlife (including reindeer). A report from Arne Sterten in 1980 warned of ‘massive or substantial’ changes in the local climate, and although actual changes because of Alta are largely anecdotal, it is interesting to note that NVE chose to ignore such warnings without regard.(58)

Analysis: the Unscientific Nature of Norwegian Administration

These errors, omissions and efforts at fraud were not necessarily isolated incidents. Nor were they the sole responsibility of the prime minister, energy minister, or

57. These comments were reprinted within: Statskraftverkene (NVE). 1976, *op.cit.*, p. 13.

58. See Borring, et.al. 1981, *op.cit.*, p. 143.

NVE director. Rather, these events were the result of both individual actions and political institutions which relied upon processes of goal displacement, uncertainty absorption and fraud to achieve goals. The Norwegian political system was open enough that a great deal of information could be presented to refute NVE's claims regarding Alta. Yet without legal structures in place to ensure oversight or to force correction of errors, simply exposing incidents of scientific fraud or censorship was not enough to prevent construction of the dam. The political system, as evidenced by the ruling of the Norwegian Supreme Court in 1982, supported the view that only government-approved experts and views mattered, regardless of the quality of evidence or arguments.

To be fair, this situation has changed in Norway in the past twenty years, with reforms coming into effect over environmental impact assessments (as of 1990), the structure of NVE, freedom of information laws, and relations with the Sami. These changes can all be attributed to the aftermath of the Alta controversy. As in the case of Hungary, the Norwegian state's attempts to bolster its legitimacy through goal displacement and fraud ultimately failed, even if the project itself was successfully constructed. The result has been efforts to remove deferment of environmental decisions to administration alone, forcing input from affected groups, independent researchers and political groups.⁽⁵⁹⁾ In other words, recent changes have been a recognition of the inability of the administrative state to effectively handle instrumental rationality and its

59. Legislation has changed the ability of utilities to develop water resources without such debate. See Arne Carlsen, et.al. 1993. "Implicit Environmental Costs in Hydroelectric Development: An Analysis of the Norwegian Master Plan for Water Resources." *Journal of Environmental Economics and Management*. 25, pp. 201-211.

attendant research.

Goal Displacement

The Norwegian state and its relationship to the water development interests in the 1970s and early 1980s was highly deficient for the handling of scientific research. The assumptions of development were not meant to be questioned, nor were the motives for construction to be attributed to anything less than 'objective needs'. The decision to build the Alta dam was meant to be based upon consideration of objective facts, for any admission of subjective (and hence, political) judgement would allow debate and the possibility that opponents could win. Yet for the heavy reliance upon the ideal of instrumental reason, NVE and the Norwegian government fell far short of even maintaining the illusion. If the decision to build the Alta dam rested upon consideration of objective facts, then why was the decision made even before NVE's own environmental and social impact assessments were completed? Why did they consistently refuse to consider new information, even information from one's own agency, and conceal information from others?

The simple explanation was that NVE did not see science as a way to gather information in order to make better decisions. Rather, it saw science as a way to manufacture 'facts' which could be used to justify the decisions it had already made. In so doing it kept to the efficiency model of organizations laid out by Brunsson (see Chapter 3), but to call the process 'science' is rather unfair. By never questioning its assumptions or conclusions, by only heeding information that would serve the causes of those

interested in water and energy development, the process of appearing to use science was simply used as a way to silence critics. Once the original decision had been made, neither NVE nor the Storting (and by extension, the prime minister) were interested in reconsidering their position. In explaining why the Storting's Committee on Forestry, Waterways and Industry refused to meet with experts who had new information regarding Alta, the committee explained, "Storting Report 61 did not require any repeated debate on the factual aspects of the Alta case." (60)

As explained in Chapter 2, the refusal to consider alternatives or conclusions is one of the earmarks of pseudo-science, and the structure of the government at the time was well suited to silencing criticism and fostering scientific mimicry. The development plans at NVE were drawn up under the same office that handled oversight and energy forecasting, creating a clear conflict of interest. This could well explain the lack of oversight and erroneous energy forecasts used by NVE, for the office's goals could not be made clear. (61) In addition, the lack of freedom of information laws made it difficult for those opposing the project to know what the government was doing. Administration often gravitated toward secrecy and compartmentalization of information, and neither condition was conducive to a science where conclusions could be questioned and underlying values debated.

60. Borring, et.al. 1981, *op.cit.*, p. 143.

61. This has since been corrected.

Uncertainty Absorption

By creating a situation in which the only official information came from the same organization that was responsible for construction of the dam, the Norwegian government placed itself in a position where independent conclusions could not be drawn. Most evidence was not available for debate, and it took investigative journalism in order to discover (or rather, prove) that NVE was using fraudulent data and forecasts. This meant that the only official conclusions were passed on to the Storting, whose own judgement was therefore limited and arguably biased toward construction of the project. Public comments were included in some of the NVE scoping documents, but did not change the conclusions of the reports. All conclusions indicating that no environmental damage would occur, that the social impacts would be negligible, could not be refuted except by those considered external to the decision-making process.

Many locals and experts familiar with the area could provide information regarding the detrimental effects of the dam, while a larger political debate could raise questions of whether the extra power produced by the project was even considered necessary. Yet only the interests of the utilities were presented, and these were passed on to the Storting in a form that was bereft of any uncertainty, did not given any indication of background assumptions, nor did they contain conditioning language. The Alta dam was necessary, it was a good project, science fully supported it, and therefore those who opposed it were acting against the wishes of the state as legitimated by science. That these conditions did not exist were of little matter; information was not provided to decision-makers in a fashion that would allow doubt or consideration of alternatives. Only research

supporting the dam was allowed.

Lessons of the Alta Dam

Ironically, it was not until after construction had started on the dam that scientific assessments for the environmental effects of the dam were funded, ostensibly to provide information for possible future mitigation efforts. Had these assessments been completed prior to construction, it is highly doubtful that the project would have been allowed to proceed.⁽⁶²⁾ This is perhaps one of the best indicators that the Norwegian government did not look for alternatives to the dam, nor seriously consider the possibility that the power demand for Finmark would not materialize. Much like the experience of the Orme dam in the US (mentioned in Chapter 3), “...It wasn’t a question of whether or not this was the best element. It was a good dam site that was empty, so you put a dam there.”⁽⁶³⁾ The ideal that information should actually be gathered and options discussed prior to decisions being made simply did not exist. The Alta case helped to develop such ideas, but in many ways they came too late.⁽⁶⁴⁾

Even though NVE knew that the power forecasts for the north were suspect, that

62. Dalland. 1997, *op.cit.*, pp. 48-49. Doubtless the planners were aware of this, and this is a common occurrence in planning situations in many countries. It is much easier to justify a project after it is built, than to justify it ahead of time.

63. Wendy Nelson Espeland. 1998. *The Struggle for Water*. Chicago: University of Chicago Press, p. 111.

64. Some writers, such as Dalland (1996, *op.cit.*) cynically argued that such changes and the creation of ‘sustainable development’ in the Brundtland government mistakenly gave the impression that more open policies had been their intention all along.

they created substantial doubt as to the need for the dam, they continued with the project as if nothing had changed. In this sense, the justifications for the dam were illusory. The organization could maintain its efficiency and direction, but could only do so by suppressing all doubt and criticism, and painting the opposition as dangerous subversives.⁽⁶⁵⁾ In many ways this follows the same pattern as the actions of the Hungarian government, although it must be admitted (with some wonder) that the Norwegian government appeared even more willing to use force (in the form of police with military support) than its communist contemporary.

What the history of Alta indicates was that the organizations responsible for construction had only construction as an objective. The larger political process and social issues surrounding the project were not of any concern, and the government did not seem to take lightly the notion that local protesters could possibly threaten the project's completion. Alta was an example of technicism and naturalistic fallacies taken to their logical extreme. Proceeding with the belief that only one answer was possible and desirable, that resolution of the debate was a largely technical matter, the Norwegian government seemed rather unprepared for the depth of feeling and reaction of locals to the plans. If the disjuncture between illusion and reality becomes too great, as it did in Norway, then the legitimacy of the process itself comes into question.

Although the dam was completed in the end, the Alta dam (like the Bős-Nagymaros project) was an example of how goal displacement and naturalistic fallacies

65. Of course, NVE was only efficient if one did not consider the costs of enforcing their plans, as well as ignoring externalities and lost opportunity costs.

may only be taken so far. The perceived need to present policies as if they were justified by science, when in actuality the 'scientific' knowledge was jury-rigged and manipulated information, created a tension in the political system. Although the legitimating principles behind the dam relied upon the aura of scientific knowledge and research, the political processes of administration effectively prevented the release or research of certain information. Updated energy forecasts were withheld from the Storting, environmental assessments were disallowed until after construction had been completed, and local knowledge of adverse impacts was denigrated and ignored by the NVE.

Chapter Six

The United States and the Animas-La Plata Project

You have to be an intellectual to believe such nonsense. No ordinary man could be such a fool.

-George Orwell

On December 15, 2000, the US Congress, under pressure to complete an agreement before the two houses adjourned following the election, passed a budget bill by an overwhelming majority vote. Among the two hundred and fifty riders or amendments placed on the bill was provision for a project to be built by the Department of Interior's Bureau of Reclamation, in a sparsely settled part of southwestern Colorado and northwestern New Mexico. What was notable about passage of the project was not only that it had been heavily criticised by the editorial page of the New York Times earlier in the year, nor that opinion on the proposed project had crossed party lines numerous times. What was most notable about the project was that it had already been authorized by the Congress thirty-two years earlier, in 1968. In fact, the Animas-La Plata project (ALP) had made it way through Congress numerous times, receiving 'final' authorization only to be forced back onto the discussion table. A project as expensive and with as much history as either the Alta Dam or the Bős-Nagymaros project, ALP has somehow managed to linger while yet never actually being built.

At the same time that ALP was being passed through Congress, a report was released from a Pentagon audit bureau which severely criticised the US Army Corps of

Engineers (a sister agency to the Bureau of Reclamation) and its handling of fraudulent data. The report indicated that, in a number of large cases, systematic fraud and data manipulation had taken place in order to justify projects. Not only was the fraud widespread, it seemed, but its use may have been endemic to the Corps and was encouraged by a number of its leaders.⁽¹⁾ To mention the Army report of the Corps of Engineers is not to simply imply that, because both agencies are responsible for construction and operation of water resource management projects in the US, therefore they must both be guilty of using fraudulent methods in justifying projects. After all, the Corps and the Bureau of Reclamation (BuRec) are controlled by separate departments (Defense and Interior, respectively), are controlled by different mandates, and even operate in different geographic locations.

Yet it is still worth asking if some of the same problems exist. Has ALP languished for so many years, not because of a lack of political will, but perhaps because of problems inherent in providing credible justifications for the project? Is the problem linked, not to any 'irrational unreasonableness' of either side in the dispute, but to the failure of the administrative process to provide a suitable forum for debate on the political values behind ALP? In other words, ALP may provide an instructive case study into the processes of goal displacement and administrative reasoning, and why these processes are antagonistic toward scientific research. Rather than being able to adequately justify the project, science may have raised enough questions to enable opponents to delay

1. Michael Grunwald. 2000. "Faulty Data Used for Army Corps Projects." *Washington Post*. 6 December 2000.

construction of ALP. The story of this project is, in many ways, of the conflict that has arisen between those proponents attempting to avoid questions and new information, and those opponents attempting to raise questions and challenge the assumptions behind the project.

For these reasons the Animas-La Plata Project provides an excellent case study for the use of science in policy, both in terms of how people attempt to use science to justify policy positions, as well as how to manipulate science so as not to conflict with political rationality. In many cases scientific reports emerged which conflicted with what supporters of the project wanted to be known. In some cases this caused delays lasting many years, in other cases agencies attempted to ignore damaging evidence under thousands of pages of supporting documents. From this tale two lessons may emerge. The first is confirmation that administrative agencies, by themselves, often cannot handle scientific research without comprising its scientific nature. The second lesson seems to be that a fair antidote for the first problem is to allow multiple access to both the science and the decision-making it claims to support.

Background to Project

The Animas-La Plata project is representative of many American water resource projects, particularly in the western United States. Various described as the 'last big water project' in the west, ALP marks the continuation of a political ideology and ideal

that has created a form of 'empire' of the west, all based on the access to water.(2) In order to assist in the ideal of settling the west and allowing farming in otherwise arid conditions, the Bureau of Reclamation was set up by the US government in 1902. Its purpose was to construct irrigation projects for small farmers in the west, the cost of which would then be paid back to the government over a number of years. Only those farms which contained less than 160 acres (64.8 hectares) or 320 acres for a married couple (130 hectares) would be allowed to benefit, and BuRec was only allowed to operate in lands west of the 100th meridian. Drawing upon ideas of 'Manifest Destiny' and the west, as well as Lockean ideas that land was only ruled by a sovereign power when it was utilized in some direct way, BuRec was meant to change the face of the western US.(3)

By the 1960s BuRec had established dam and irrigation projects in every major river in the western US, particularly the Columbia and Colorado River basins. It was responsible for constructing Hoover Dam on the Colorado and Grand Coulee on the Columbia, for providing water to Imperial Valley and Los Angeles in California, and to Phoenix and Tucson in Arizona. The Bureau could transport water through the Continental Divide from Summit County to Denver in Colorado, or over the Tehachapi Range from the Feather River to Los Angeles. The Animas-La Plata project was fairly

2. One of the best histories of this development is Donald Worster. 1985. *Rivers of Empire*. New York: Oxford University Press.

3. For a background on land-use philosophy, see Matthew Cahn. 1995. *Environmental Deceptions: the tension between Liberalism and environmental policymaking in the United States*. Albany: SUNY Press.

modest in comparison to some of these projects, although the concept remained the same: transport water from where it was, to where it was not.(4)

Animas-La Plata derives its name from the two major rivers to be changed in the project, both of which have their headwaters in the mountains of southwestern Colorado, and ultimately flow into the Colorado River. The Animas has its headwaters in the San Juan Mountains, very close to the source of the Rio Grande, while the La Plata has its source in the more arid La Plata Mountains. The Animas and La Plata are separated by a ridge only 275 metres high and seventeen kilometres wide, yet this short divide disguises the stark differences found between the two basins. The Animas River is fed from a much greater snowpack, so that its annual estimated average flow is 414,000 acre feet, while the drier La Plata has an average of only 32,000.(5) To complicate matters for local farmers, the most arable land is also located in the basin with the least amount of water. Land around the Animas River tends to be rocky, broken and generally unsuitable for either farming or pasture.

Many locals therefore thought that the best course of action would be, somehow, to divert water from the Animas to the La Plata River. The plan for doing so was

4. Of course, not all BuRec projects were strictly irrigation-related. But since the program was expected to (at least partly) pay for itself, hydroelectric facilities were also built to raise revenue for irrigation-related concerns. These are generally known as 'cash register' dams.

5. US Bureau of Reclamation. 1980. Animas-La Plata Project, Final Environmental Statement, p. A5. An acre foot is the standard unit of measure for US water projects. It represents the amount of water that can cover an acre of land with one foot of water, and is approximately equal to 1235 cubic metres. For the sake of consistency, acre-feet will be used as the unit of measure in this chapter.

conceived earlier in the 20th century, and official plans for the project were first drawn up by BuRec in 1938. What the plan entailed was a pumping plant located on the Animas River near Durango, that would raise water some 160 metres to a reservoir located in the Ridges Basin, creating a reservoir substantially higher in elevation than the town below it. This was not entirely unheard of; Lake Dillon in Summit County, Colorado had been created so that the whole town of Dillon had to be moved to higher elevation, and the town of Silverthorne then sat below a massive dam. What was unusual about ALP was that, rather than damming the flow of a river itself, the water had to be pumped up to the reservoir site. Such a process would require a massive pumping station that would use over 100 million kilowatt hours of electricity.(6)

This was only the first step. From the Ridges Basin Reservoir, water would have to be pumped again up 90 metres to the Dry Side canal (requiring another 50.5 million kilowatt-hours of electricity), then run through irrigation canals for 43 kilometres before reaching the irrigated lands.(7) A second reservoir, the Southern Ute, would be constructed downstream of the La Plata River. This second reservoir would provide water for the Southern Ute Indian tribe and for downstream uses in New Mexico. In total, ALP would provide irrigation water for those farmers on the 'wrong' side of the river basin, with total withdrawals from the Animas as high as 133,300 acre/feet annually, irrigating 28,390 hectares of land in Colorado and New Mexico. Proponents also planned that water be used for the city of Durango itself, but such municipal and industrial (M&I) uses had

6. *Ibid.*, p. A6.

7. See Figure 4.

to be diverted to the Durango municipal water works, which unfortunately was on the wrong side of the valley from Ridges Basin. This required yet another pumping station.(8)

Original Justifications for ALP

The 1956 incarnation of the project was proposed to Congress virtually unchanged from its original form, and was one of twenty-five potential projects listed under the Upper Colorado Project Act of 1956. BuRec was very supportive of the project, completing its feasibility studies ahead of time, and the final recommendations for approval of ALP were complete and sent to Washington by 1962. ALP was a fairly standard project for those times, and little justification was deemed necessary for passage through Congress in order to start construction. The project would benefit the area economically, both in terms of agriculture and increased recreation from having more reservoirs in the area, and the initial cost-benefit analysis completed for ALP indicated that, for every dollar invested in the project, 1.89 dollars would be returned to the area in increased revenue and commerce.(9)

The ALP proposal was sent around to other agencies for comments and criticisms, including such agencies as the Bureau of Sports, Fisheries and Wildlife (later to become

8. And due to the geomorphic features of land in the Dry Side irrigation area, three additional pumping stations would be required to provide enough water pressure for irrigation.

9. A good background history to the project can be found in: Helen Ingram. 1990. *Water Politics: Continuity and Change*. Albuquerque: University of New Mexico Press, pp. 66-83.

the US Fish and Wildlife Service, or USFWS).(10) No executive agency voiced any concerns over the proposal, and the only possible reservations given were by the state of California, whose own interests were concerned with preventing any project which would use Colorado River water before it could reach California. California's objection was very minor at the time and was not even directly aimed at ALP, but what it represented was very important in the minds of those who most fervently supported the project and its timely construction. American water rights had been established largely on a first-user basis. That is, whoever first found a suitable use for water was given senior water rights, and no one else (even upstream) could infringe upon that use without just compensation. Southern California, always desperately short of water, had an enormous stake in developing as much of its water as it could before such rights were preempted by another user.

In an effort to prevent the larger states such as California from appropriating everything from the Colorado River, in 1922 several states (Colorado, New Mexico, Arizona, Nevada, Utah and California) agreed to the Colorado River Compact, which allocated a certain amount of water to each of the states. A later treaty with Mexico also tried to ensure (rather unsuccessfully) that water flowing into Mexico's Gulf of California would also be sufficient for farming and fishing in that area. Two major problems emerged from this Colorado River agreement. The first was that the agreement had been based upon average rainfall during a time when, it was later learned, the river flow was substantially higher than the long-term average. The Compact assumed a 17.5 million

10. The Environmental Protection Agency (EPA) did not exist until 1970.

acre-feet annual flow, based upon eighteen years of observations of the rivers' flow. But soon after the agreement had been made, the average fell dramatically. As one hydrologist pointed out in 1953, the Colorado only averaged 11.7 million acre-feet since 1930.⁽¹¹⁾ Related to this was the problem that California, and later Arizona, were using more than their share of the agreement, meaning that in real terms states like California were taking a substantial fraction of the Colorado River flow.

To people in the upstream states like Colorado, this meant that they had to be sure to develop their use of water before it would be forever lost to California and Arizona. The increasing pace of water and irrigation projects in the 1950s and 1960s provided the impetus for this feeling a sense of urgency, particularly as Congress was beginning to consider a large set of projects collectively known as the Central Arizona Project (CAP). CAP was an effort to develop the deserts of Arizona, providing water to the cities of Tucson and Phoenix, as well as farms located in between. It was a massive undertaking, and would divert up to two million acre-feet of water from the lower basin rivers to the Arizona desert. Although officially a BuRec project, CAP was in effect under the care of Stewart Udall, the powerful Interior Secretary from Arizona, who saw CAP as the only way of ensuring future development of his state. He, too, thought that any water not immediately developed for agricultural and M&I use would be lost to California.

Colorado quickly responded. Its senior Congressional representative, Wayne Aspinall, a former schoolteacher from western Colorado who was now chair of the

11. Marc Reisner. 1993. *Cadillac Desert: The American West and Its Disappearing Water*. New York: Penguin Books, pp. 262-263.

powerful House Interior and Insular Affairs Committee, saw a double threat from California and Arizona. New figures had been presented to him indicating that, if the CAP were passed, then Colorado would lose its water rights and it would be unlikely to win them back. He therefore urged that the projects proposed under the Upper Colorado River Storage Act be passed quickly, to ensure that Colorado's share of its riparian rights were not lost. If they were passed at the same time as CAP, then no major conflict should emerge between Colorado and Arizona over those rights, and Aspinall was in the position to force Udall to accept those conditions. Of the five projects that Aspinall needed, Animas-La Plata was one.

ALP and its Cost-Benefit Analysis

Legislative Background

At the same time that debates over use of Colorado River water were taking place, ALP had encountered difficulties in its executive review. Although passing the review of other agencies, the Budget Bureau (predecessor to the Office of Management and Budget, or OMB) responded that it was unsatisfied with the project's cost-benefit analysis (CBA). Such analyses had been used to justify water projects for many years in the US, and were a basic prerequisite for executive projects of this type. For although authorization and funding for the project had to come from Congress, much of the management of budgets

for cabinet departments was handled by the executive branch itself.⁽¹²⁾ The Budget Bureau in essence worked for the President, and could effectively scuttle any project which it deemed was not worthy to pass on to Congress for legislative approval. The Budget Bureau took exception to BuRec's claim that the cost-benefit ratio would be 1 to 1.89, stating that this was only possible if one took into account indirect benefits which were largely arbitrary and unsubstantiated. If direct benefits alone were considered, then the ratio would drop to 1 to 0.98. Seeing a return lower than 'unity' the Budget Bureau suspended the Animas-La Plata project.

Aspinall was well aware of the status of ALP at this time, and told Arizona's Udall that consideration of the Central Arizona Project would not take place in the House Interior Committee until the Budget Bureau released ALP. In response, Udall directed BuRec to recompute the ALP cost-benefit analysis. Knowing that several major projects would be held up or lost if ALP was not passed, BuRec immediately sent Dan Dreyfus (BuRec's in-house CBA expert) back to Colorado to ensure that the project would be justified in the eyes of the Budget Bureau and the White House. Years later, Dreyfus would admit that his actions were entirely fraudulent. In an interview with Marc Reisner he said,

'Those projects were pure trash. . . . I knew they were trash, and [BuRec Commissioner] Dominy knew they were trash. The way they got into the bill was, Aspinall called up Udall one day and said, "No Central Arizona Project will ever get by me unless my five projects get authorized, too." When Udall passed the word on to us, we were appalled. The Office of Management and Budget had just

12. The Bureau of Reclamation is contained within the cabinet-level Department of Interior.

bounced Animas-La Plata. Now we had to give it back to them and make them reverse themselves. I had to fly all the way out to Denver and jerk around the benefit-cost numbers to make the thing look sound.’(13)

The cost-benefit numbers were increased to 1.1 to 1.11, barely above unity. It would be enough, however, to justify the project to the Budget Bureau, although it did so with obvious reluctance. The Budget Bureau did not actually ‘approve’ the project, it merely released the proposal without comment.(14)

Yet as if ‘fixing’ the numbers in the cost-benefit analysis were not bad enough, the Bureau of Reclamation even attempted to talk Aspinall out of supporting the project, such were its own reservations about the project. Considering the interest which BuRec had in promoting any project Congress was willing to fund, such an action was rather exceptional and not indicative of a healthy project proposal. Dreyfus went on to say,

‘As a last resort. . . Dominy and I went to see Aspinall and tried to talk him out of it. Dominy said, “Look, Congressman, these projects won’t work as irrigation projects. We can’t afford to pump water from the reservoirs to the irrigable lands because we haven’t got any surplus power in the river, and the alternative is to follow the land contours with canals that are going to be ungodly long and expensive. They’ll cost so much you might run into some real problems getting appropriations for these things.” What Dominy suggested was to build the dams and forget the rest. He said, “What you really want is to capture your entitlement. The dams alone will do that. California will never see that water, and you’ll cut

13. As quoted in: Reisner. 1993, *op.cit.*, p. 292.

14. It is worth noting that the original use of CBAs was to provide a measure of relative costs and benefits among alternatives, not to establish an absolute scale for political acceptability. To say that any project that achieves unity or greater in an analysis is worthwhile, misconstrues the theoretical basis for much of the analysis.

the cost in half.”(15)

Aspinall refused, arguing that any project of this nature required beneficiaries in the form of farmers. Strictly speaking Aspinall was correct, as BuRec could not legally construct a project which had neither hydroelectric potential nor irrigation features. It may have been that Dominy was suggesting that the Army Corps of Engineers build the project, instead. It is worth remembering Dominy’s suggestion of simply capturing an entitlement, as it would resurface some twenty to thirty years later.

Specific Problems with the Cost-Benefit Analysis

As the initial cost-benefit analyses were intended to provide a quantitative (and hence, scientific) justification for authorization of the project, it is perhaps worth examining why even the Bureau of Reclamation was unhappy with their assumptions. To some people, ALP and its sister projects were always justified economically, regardless of what the CBA may have showed. People like Felix Sparks, head of the Colorado Water Conservation Board, felt that CBAs were always biased in favour of rejecting projects, and that they could not reflect the true value to an economically depressed area like that of southwestern Colorado. As the economic future of the area was always in doubt among its residents, ALP could only provide benefits which helped to ensure that water would be available for future growth and development. For an area whose largest town, Durango, had only recently paved its municipal streets, such feelings could not be dismissed out of

15. As quoted in: Reisner. 1993, *op.cit.*, p. 292.

hand.

Yet the reason why CBAs are often useful would be to determine if the seven hundred million to one billion dollars required for Animas-La Plata could be better spent elsewhere or in another manner. This necessitated legal requirements to provide for at least a modicum of economic benefit from the investment of federal funds, and it became obvious from Dreyfus's admissions that these legal conditions were broken. This is reflected in the current admission by BuRec that the ratio is possibly as low as 1 to 0.4, a far different number than the original pronouncement of 1 to 1.89.⁽¹⁶⁾ Such an admission did not come easily for BuRec, and in fact it did not come at all until after an internal Department of Interior audit revealed that the economic basis for ALP was "infeasible". Due to spiralling costs, the auditors recommended that up to one third of the project be abandoned, mostly in those areas dealing with irrigation.⁽¹⁷⁾

The original plans were very expensive partly because they provided for irrigation of marginal agricultural lands, where the investment per acre was often many times higher than the land valuation. Initial estimates claimed that nearly \$7000 would be spent per acre of land, where often the land costs no more than \$500-1000. The area to be irrigated is located above an elevation of 2000 metres, with a frost-free season of merely 140 days, where typically only alfalfa can be grown.⁽¹⁸⁾ When the CBA ratio had to be

16. US Dept. Interior. 1986. News Release on the Animas-La Plata Project. 13 June 1986.

17. Mark Obmascik. 1994. "Big Cutback Urged in Animas Project." *Denver Post*. 13 July 1994, p. 6A.

18. It is worth noting that alfalfa is one of the least valuable crops in the US, and that
(continued...)

improved, Dreyfus simply removed some of the irrigated lands and included more municipal and industrial uses for the cities of Durango, and Farmington, New Mexico. His comments made above, however, give some indication as to what other variables were intentionally left out of the analysis.

The first gross omission was the necessity for large amounts of electrical power to pump water upslope to the reservoir and then to the irrigated lands. The basic assumption, and one seen in many other BuRec project proposals, was that cash register dams elsewhere in the system would provide the necessary electricity. That no surplus power existed in the grid had already been alluded to, consequently BuRec would have to divert power from current users and provide it to its own project at a highly discounted rate. Such a diversion creates an opportunity cost imposed upon outside users, who must then find more expensive power elsewhere. Essentially, the federal government would be directing the Western Area Power Administration to sell electricity to the project at below-market rates. One study indicated that the omission of this cost imposition created a discrepancy of over \$11 million, while others indicated that it would be around \$6 million per year.⁽¹⁹⁾ Another very expensive omission was also alluded to by Dominy in his discussion with Aspinall. ALP would require long irrigation canals, and in order to prevent seepage of water along the many kilometres the water would have to travel, such

18.(...continued)

Department of Agriculture programs exist to pay farmers in other parts of the country not to grow this crop in order to maintain market price levels.

19. See Howe, Charles. 1980. Critique of a Contemporary Multi-Purpose Water Project Evaluation in the United States: Animas-La Plata Project, Colorado and New Mexico. Center for Southwest Studies Archive, Fort Lewis College, Durango, Colorado.

canals would have to be lined. Such a process is incredibly expensive, yet was never mentioned in the earlier cost-benefit analyses.

One of the largest discrepancies had to do with increasing salinity of projects waters. This is not simply an environmental impact; agriculture which must rely upon salinized water suffers proportionate economic losses from decreased crop yields and loss of arable land. Such a problem becomes increasingly severe as more return flows from irrigation flows are drained back into a river system, and is particularly acute in the Colorado River system. In fact, current salt levels in the Colorado as it flows into Mexico are so high that farming and fisheries in the area are now almost non-existent, and the US had to build a costly desalinization plant in an attempt to meet treaty obligations for water quality.

Because these are primarily downstream impacts, ALP would not suffer greatly from salinization processes. Construction of the project would, however, increase salt and mineral loads of return flows from the project by 18.6 mg/l, resulting in economic impacts downstream from the project site. Although this may seem to be a low number, its impact rises exponentially the more saline the water in the system already is. A Department of Interior study from 1980 estimated that economic damages to municipalities and agriculture from an increase of one mg/l could cost around \$1.5 million.⁽²⁰⁾ Another 1980 study indicated that ALP could cost the region in the area of

20. Alan P. Kleinman and F. Bruce Brown. 1980. *Colorado River Salinity: Economic Impacts on Agricultural, Municipal, and Industrial Users*. Denver, Colorado: Colorado River Water Quality Office, Engineering and Research Center, US Department of Interior, p. 18.

\$145 million of lost revenue to agricultural industries, enough to severely skew the cost-benefit analysis away from a favourable ratio. But since such industries were not in the project area, they were not admitted until after the DOI audit. A further argument was given by project proponents

...since it is believed that the rights to divert and deplete streamflows in the Upper Colorado River Basin provided for by the Colorado River Compact of 1922 are associated with a corresponding right to concentrate the salt load of the stream without penalty.(21)

In other words, ALP proponents were well aware of the issue of salinization, yet refused to take or admit responsibility for any damages because of legal precedents established half a century prior to enactment of the Clean Water Act.

A chronic problem with BuRec cost-benefit analyses had to do with the nature of cost overruns in construction and operations costs. A General Accounting Office report indicated that BuRec projects typically involve severe cost overruns, that project participants are often unable to meet their payment obligation, and such costs are then borne by the government.(22) Such figures are hardly exaggerations. The Dolores Project, sited close to ALP and a sister project approved as a control measure against the Central Arizona Project, was built at nearly four times its original project cost. The irrigation water from the Dolores turned out to be so expensive that the farmers who had originally

21. Howe. 1980, *op.cit.*, p. 20.

22. US General Accounting Office. 1996a. *Bureau of Reclamation: Information on Allocation and Repayment of Costs of Constructing Water Projects*. Washington, DC: GPO.

contracted with BuRec to buy the water could not possibly pay the inflated prices, and went to court to be absolved of their contractual obligations.(23) If ALP suffers from the same problems, it will receive almost no benefits relative to the costs. Cost overruns alone could reduce the CBA ratio to 1 to 0.1, or less.

BuRec was also not consistent in how it used discount rates to determine future costs and benefits. The initial discount rate quoted for the project was 3.25%, a figure which has been criticized as overly low because it underestimates what farmers in the area will have to pay for irrigated water, and hence underestimates costs of the overall project. Yet 3.25% was not used throughout the analysis. In some places a discount rate of 6.6% was used, which would have made possible alternatives look more expensive, as well as increasing benefits from M&I uses. Mixing the two rates makes accurate comparison of alternatives difficult to impossible, while at the same time making ALP appear more attractive. Finally, a discount rate of just over 3% is unrealistic for prediction of future power costs associated with operation of ALP, as newer cost-sharing agreements among power utilities have changed rates to closer to 8%.(24)

With all the problems associated with the cost-benefit analysis for ALP, and with the chronic overstatement of benefits by BuRec, the Inspector General of the Department of Interior indicated that the project would actually have a negative cost-benefit ratio.

23. James Decker. 1991. *Conflicts in the Department of Interior: Water Project, Indian Trust Responsibility, and Squawfish*. Paper prepared for the 1991 Annual Meeting of the Western Political Science Association, Seattle, Washington, March 21-23, 1991.

24. This cannot be separated from consideration of total cost overruns mentioned previously, as it is often a key contributing factor.

That is, the US (and Mexico) would lose more money than would be invested in the project; the more that it invested, the more that is lost.⁽²⁵⁾ Despite the overwhelming evidence that the project will produce no benefits for the investment, what is interesting is that certain writers and spokespeople continue to insist that ALP will benefit the region. This may be partly based upon the argument (largely misleading), most poignantly represented in a 1987 promotional advertisement for ALP, which claims that the project should be supported, "...because someone else is paying most of the tab!"⁽²⁶⁾ Yet it is also present in arguments that the US federal government is treating the West unfairly. This argument is what William Pendley wrote of in *War on the West*, where he argues that any federal opposition to ALP is tyrannical and unreasonable, as "...revenues generated by the sale of power will more than pay for the cost of construction, with interest."⁽²⁷⁾

The reference to power revenues funding the project is curious, because it also appeared as a primer for survey questions regarding support of ALP back in 1985. Prior to asking whether or not residents supported ALP, the public relations firm of Talmey Research stated,

Most of the cost of the Animas-La Plata project will be paid for by selling

25. US General Accounting Office. 1995. *Animas- La Plata Project: Status and Legislative Framework*. Washington, DC: GPO, p. 13.

26. As printed in the *Durango Herald*, 29 November 1989.

27. William Pendley. 1995. *War on the West: Government Tyranny on America's Great Frontier*. Washington, DC: Regnery Publishing, p. 64.

electricity generated by the project to other states, Indian tribes who will receive the water and the federal government.(28)

Where is this power coming from, if the Animas-La Plata project itself is a net user of electricity? The answer is that, under pressure from President Reagan, ALP proponents were forced to accept cost-sharing agreements whereby the state of Colorado and the Animas-La Plata Water Conservancy District had to make up some of the difference between costs and benefits for the project. Accordingly, most of the costs of the project (under certain configurations) would come from revenues from Colorado River power generation. The survey was thus misleading because the revenues would come from other projects, not ALP itself, and thus represented a form of bookkeeping rather than an actual net increase in revenues. This form of accounting trick was one of the ways in which ALP drew criticism from the DOI internal audit.

Environmental Problems of ALP

Problems with the Animas-La Plata project came from more than simply economic arguments or the realization that economic methodologies had been often fraudulent. A number of groups both within and outside government voiced concerns over the impacts which ALP would have upon the environment, and felt that BuRec was attempting to avoid the importance of such issues. It is important to remark from the

28. Talmey Research, Inc. 1985. *Results of Animas-La Plata Water Survey*. Project 1072-85, December 1985, p. 5.

outset that many of the arguments concerning the environment were not new debates over incommensurable values. That is, if opponents of the project criticized environmental impacts, such arguments were not made in the absence of supporting legislation. Many environmental impacts of ALP have a good possibility of exceeding or violating state and federal environmental laws. For this reason special focus will be placed upon those environmental impacts which may be illegal, and how/why BuRec and the Department of Interior have attempted to circumvent such requirements.

Animas-La Plata, of course, was first conceived many years before environmental legislation was passed in the US. Its first authorization date, 1968, came a year before Congress passed the National Environmental Policy Act (NEPA), before creation of the EPA, and before passage of the Clean Water Act and Endangered Species Act. It is perhaps fair to say that ALP was merely unfortunate to have been delayed in its construction. Had it been started earlier, this project would have been little different from dozens of similar projects in the West, which likewise would have been unable to pass inspection after the 1970s. But because of changes to its original plans, the project fell under jurisdiction of the NEPA process, which required the first environmental impact statement for Animas-La Plata to be released in 1980.

Forcing Openness in the Process

As part of the NEPA process, BuRec was required to establish greater openness in

its decision-making process.(29) The primary idea behind NEPA was that it was far better and easier to prevent environmental damages than to mitigate them after the fact, so decision-making processes of federal agencies should be changed to avoid such impacts. Despite questions regarding the efficacy of forcing EISs to be completed prior to decision-making, NEPA certainly changed organizational processes for agencies working on environmentally-sensitive topics.(30) In many ways, the basic assumptions of NEPA went strictly counter to those of Brunsson's 'efficient' organization, where information is constrained, alternatives determined ahead of time and objectives constructed after the fact. The hope of NEPA was to provide more information, to consider more alternatives and to judge these based upon predetermined objectives.(31)

The primary threat which NEPA posed to the Animas-La Plata project was in regards to environmental impacts on the region and downstream water flows. Specifically, ALP threatened to violate state and federal environmental laws with regards to endangered species and water quality. It was upon these bases that agencies such as the EPA, US Geologic Survey (USGS), US Forest Service, New Mexico Environment

29. This aspect of NEPA, however, was really just as extension of similar measures in the Administrative Procedures Act of 1946.

30. See Lynton Keith Caldwell. 1989. "Understanding Impact Analysis: Technical Process, Administrative Reform, Policy Principle", in : *Institutionalized Analysis as a Policy Strategy*. Bartlett (ed.), Westport: Greenwood Press, pp. 7-16.

31. Much academic work has been done in this are, although some of the best writings have been done by Robert Bartlett. For example, see: Robert Bartlett and Walter Baber, 1989. "Bureaucracy or Analysis: Implications of Impact Assessment for Public Administration", in : *Policy Through Impact Assessment*. Bartlett (ed.), Westport: Greenwood Press, pp. 143-153.

Department and USFWS expressed their concern and delayed the project's completion. In contrast to the 1960s, when plans for ALP were simply passed to other agencies for comments yet only the Budget Bureau had the power to delay proposals, by the 1980s and 1990s the situation had changed dramatically. The EPA could refuse to accept an EIS as inadequate if it felt that the information it contained was incomplete. Other agencies, armed with federal legislation such as the Clean Water Act or Endangered Species Act, could force BuRec (via the federal courts) to cease construction. And non-governmental actors could bring court suits against BuRec in order to force it to comply with the NEPA, Administrative Procedures Act (APA), Freedom of Information Act (FOIA), and similar procedural laws. The Bureau of Reclamation was certain to face a difficult time, because the environmental problems it threatened to create were formidable.

Water Withdrawals and Endangered Fish- Enter the Opposition

The earlier environmental assessments carried out by BuRec on the project area did not identify any significant environmental problems. In fact, it went so far as to claim that construction of the new reservoir and irrigation lands would create a net increase in wetlands areas and fisheries opportunities.⁽³²⁾ Proponents of the plan did not see Ridges Basin as much more than a dry and desolate area, which could only benefit from having water from the Animas stored within it. Certainly no one gave any substantial reason for opposing ALP for environmental reasons, and even constant problems such as salinity

32. US Bureau of Reclamation. 1980. Animas-La Plata Project, Final Environmental Statement, p. C-35.

were only mentioned by the EPA in 1980 in regards to the cost-benefit analysis. BuRec was still expected to undertake assessments of the project impacts in relation to such areas as wildlife and soil toxicity, but an outright cancellation of the project was not expected.

This conclusion can be drawn from the reaction to the actions of the US Fish and Wildlife Service in May 1990. Animas-La Plata had finally been given approval for construction, yet the day before the groundbreaking was to begin the USFWS released a draft biological opinion that the project would threaten the Colorado squawfish and razorback sucker. The squawfish, an endangered species that is essentially a two metre-long minnow, was found in small numbers downstream of the project site, as was the 'threatened' razorback sucker. The USFWS feared that the proposed water withdrawals from the Animas River would destroy the extant populations of fish, which require certain water conditions in order to survive. Under provisions of the US Endangered Species Act (ESA), the Fish and Wildlife Service was required to halt BuRec's construction of the project until it could determine a reasonable alternative to cancellation of ALP. The Service stated that it would take seven years in order to make such an assessment; ALP would be put on hold until that time.(33)

The decision drew criticism from local proponents and media that were scathing, to say the least. One of Colorado's US senators (William Armstrong) said that the Fish and Wildlife Service had "taken leave of their senses," while newspaper articles and

33. US Fish and Wildlife Service. 1991. *Revised Draft Biological Opinion for the Animas-La Plata Project*. Center for Southwest Studies Archives, Fort Lewis College, Durango, Colorado.

editorials contained such headlines as “Trash Decision”, “Nonsensical Decision,” “Biologists playing us for suckers,” and “Squawfish, unicorns and other ecological deceptions.”(34) Many pointed out that, as late as the 1960s, agencies such as USFWS had tried to poison the squawfish in the Animas and nearby rivers. The rationale at the time was that the squawfish was in competition with sports fishermen for species such as trout, and the practice was not stopped until the squawfish was listed as an endangered species in 1967. In fact, so thorough had changes to their environment been (mostly through river flow depletions), that until around 1987 it was thought that no viable populations of squawfish still existed in the area.

ALP supporters felt that the timing of the decision, the day before construction was due to begin, was far too suspect and that the decision must have been politically motivated.(35) Project proponents charged that environmentalists had been taking part in secret meetings with the USFWS, and that the Service was only interested in scuttling any possible water project in that part of the country.(36) The actions by USFWS created a confusing political situation, because both BuRec and USFWS are part of the Department of Interior, and therefore were both responsible to the Secretary of Interior (then Manuel

34. As quoted by: Lisa Jones. 1990. “Fishing in Troubled Waters.” *High Country News*. 17 December 1990. The headlines appeared in *The Daily Sentinel* (May 9, 13), *The Daily Times* (May 9) and *Pueblo Chieftan* (May 14) of 1990.

35. See Animas-La Plata Water Conservancy District. 1990. Press release regarding US Fish and Wildlife Service Jeopardy Opinion on the Colorado River Squawfish. 22 May 1990. As discussed in earlier chapters, it is difficult to conceive of how any political action could be ‘scientifically’ motivated.

36. James Decker. 1991, *op.cit.*, p. 17.

Lujan). Yet Lujan could do nothing without acting against the Endangered Species Act, creating the impression that Interior was leaderless while its various offices fought each other.

The truth of the matter was that the Bureau of Reclamation had requested that the Fish and Wildlife Service conduct a survey of the squawfish after several were found in the Animas River. After three years, USFWS was concerned that the project might harm the small population that it had found and was studying, so was legally required under the ESA to halt construction until it could determine what the best course of action would be.⁽³⁷⁾ The seven year study used the nearby Navajo Reservoir to simulate conditions that would exist under completion of ALP, and used this study to conclude that water depletions from the Animas River should exceed no more than 57,100 acre-feet. This effectively reduced the size of the project from over 150,000 acre-feet, and put into question the possibility of using ALP as a source of irrigation water. In addition, water would be withdrawn from the Navajo Reservoir in order to simulate spring flood conditions for the squawfish, which is necessary for their spawning.

While the USFWS was drawing up its biological opinion on the squawfish and razorback sucker (which by then had also been listed as an endangered species), BuRec had completed its own revised plans for a smaller version of ALP. This was an 'entry-level' start for ALP to be constructed while USFWS conducted its seven-year study, with later phases to be built after completion of the squawfish study. This phase of the project broke ground in October 1991, but was stopped in February 1992 by the successful

37. See US Code 16 Section 1536 §A2

lawsuit of environmental groups. Those groups contended that it was illegal for BuRec to proceed with construction of a project before all relevant environmental studies had been completed. This included not only the squawfish and razorback sucker studies, but were also directed against soil toxicity studies which BuRec should have conducted as late as 1986, but had failed to do so. An injunction against further construction was issued in September 1992.

Toxic Soil, Dirty Politics

The soil studies were worrisome, although it could hardly be said that they came as a surprise to those familiar with the area. The USGS had indicated that the southwestern areas of Colorado were susceptible to selenium leaching and subsequent contamination of reservoir or irrigation water, but BuRec had failed to complete its studies on ALP's impacts in this area. Selenium is a trace metal which in extremely low quantities is essential to ecological systems, but which quickly becomes toxic if ingested in levels higher than even a few grams (g) per litre (l).⁽³⁸⁾ Moreover, selenium (like methylmercury) quickly bioaccumulates in an ecological system, so that predators and humans are disproportionately affected by higher levels of ingestion. One of the most visible examples of this damage came as the result of another BuRec project, where selenium leachates in the Kesterson National Wildlife Refuge caused massive malformities, birth defects, and infant mortality among wildlife (primarily migratory

38. Generally selenium and mercury levels are noted with the symbols $\mu\text{g/l}$ (as in $6 \mu\text{g/l}$), which refers to the average amount of the material in grams per litre within a specified set.

water fowl) in the area.(39)

Selenium would not only severely affect the project area, but would release the metal into downstream flows, including the Colorado River itself. Considering that much of the water would not only be used for municipal purposes, but more problematically would also exist in reservoirs which promote sport fishing, the risk to human and predator populations increases significantly. In its 1992 draft supplemental environmental statement, BuRec claimed that the toxicity levels of water from the Animas-La Plata would be the same for return flows as currently exist in the rivers. This point was vigorously challenged by the USGS, USFWS, EPA and Department of Agriculture. The USFWS wrote,

Reclamation projects the quality of irrigation return from newly irrigated lands to be similar to existing return. However, the large area of new irrigation will introduce new quantities of leachates which presumably will become additive to those already occurring. With several hazardous contaminants already exceeding guidelines in some cases (sometimes substantially), the large increase of new irrigation return under project operation seems likely to increase both the frequency and magnitude of these occurrences. Even soil concentrations below levels of concern will incrementally add to those already occurring in affected streams. Further, substantial flow depletions in the La Plata River will serve to concentrate these contaminants even more. . . . These issues have not been addressed in the Supplement.(40)

These included not only levels of selenium and mercury, but silver and copper, as well.

39. See T. S. Presser. 1994. "The Kesterson Effect." *Environmental Management*. 18, pp. 437–454. For effects of mercury and methylmercury poisoning, see A. Renzoni, et.al. 1998. "Mercury Levels along the Food Chain and Risk for Exposed Populations." *Environmental Research, Section A*. 77, pp. 68-72.

40. US Fish and Wildlife Service. 1992. Comments on the Animas-La Plata Draft Supplement to the 1980 Final Environmental Assessment. 18 December 1992, p. 5.

The 1992 Draft Supplement often claimed that negligible impact would be experienced by the newly irrigated lands, but provided no evidence of those levels or how they had been examined.(41)

The Water Quality appendix to the Supplement did admit that local sources of selenium existed in the project site, but downplayed their significance. Pointing out that certain runoff events can produce concentrations of selenium as high as 10-200 $\mu\text{g/l}$, BuRec claimed that the total dissolved concentrations (meaning the amount which can be oxidized and taken into the food chain) would remain as low as 2-4 $\mu\text{g/l}$. The remaining unsoluble selenium would (it was hoped) be deposited at the bottom of Lake Powell, the massive reservoir created by the construction of the Glen Canyon Dam.(42) The soluble levels projected by BuRec, however, are still considered too high by a number of ecotoxicologists, who point out that bioaccumulation in impounded areas (such as reservoirs) and with associated recreation (such as Lake Powell) are especially susceptible to selenium levels. In such areas, 1-2 $\mu\text{g/l}$ is perhaps the safest maximum level of dissolved selenium, whereas projected levels as a result of ALP may be as high as 10 $\mu\text{g/l}$.(43)

Reaction from the EPA to the 1992 draft EIS was sharp. In its official comments

41. *Ibid.*

42. US Bureau of Reclamation. 1996b. Animas-La Plata Project; Final Supplement to the Final Environmental Impact Statement, Appendix B: Water Quality, p. B-167.

43. A. Dennis Lemly. 1997. "Environmental Hazard of Selenium in the Animas La Plata Development Project." *Ecotoxicology and Environmental Safety*. 37, p. 94. See also A. Dennis Lemly. 1996. "Evaluation of the Hazard Quotient Method for Risk Assessment of Selenium." *Ecotoxicology and Environmental Safety*. 35, pp. 156-162.

regarding the report, the EPA stated that numerous problems and questions had been overlooked, particularly in regard to water quality. The draft was classified as “EO-3, environmental objections and inadequate.”(44) Of initial concern were numerous comments by BuRec that studies had not yet been completed, but assurances could be given that impacts would not be significant and that discussions of mitigation (if any) could be deferred to a date after construction had commenced. In response, Jack McGraw wrote for the EPA,

Reclamation has initiated a project that will have significant environmental effects. It is not desirable to defer either the analysis of impacts or mitigation until negative effects are verified since NEPA seeks disclosure of analysis and mitigation at the time of the Record of Decision (ROD).(45)

Continuing its critique of the draft supplement, the EPA stated that ALP would create water conditions that would exceed New Mexico’s water quality standards (and hence would be in violation of the US Clean Water Act, which prohibits actions by the federal government that violate state laws). Animas-La Plata could only worsen conditions that were already exceeding federal guidelines for mercury and selenium levels, which means that even if BuRec was correct in claiming that water quality would remain the same, it would still be in violation of the Clean Water Act. EPA also pointed out that BuRec could only maintain its exemption from the Clean Water Act because it had argued the

44. US Environmental Protection Agency. 1992. Letter from Jack McGraw (Acting EPA 8th Region Administrator) to Roland Robison (Regional Director, Bureau of Reclamation), regarding review of the Draft Supplement to the Final Environmental Statement, Animas-La Plata Project, 15 December 1992, p. 2.

45. *Ibid.*, p. 4.

project would create a net increase in wetlands, yet were inconsistent in such assertions.(46)

At roughly the same time, the Sierra Club Legal Defense Fund successfully sued BuRec in four lawsuits related to violations of the Clean Water Act, Freedom of Information Act, Endangered Species Act, Administrative Procedures Act, and National Environmental Policy Act. Many of the violations were in regard to meetings which were kept closed to the public, and violations of US administrative law meant to keep the decision-making process open. These same allegations were not to disappear, but continued to follow ALP through the year 2000.

The View from the South

The Bureau of Reclamation rewrote its 1992 Draft Supplement, only to find that the state of New Mexico's Environment Department found fault with its release in 1996. The objections from New Mexico had the potential to cancel the project, and were interesting not only for their political value but for their methodologies. The EPA had defined its selenium and mercury levels only in terms of "biologically available" metals, which would generally exclude the insoluble selenium mentioned earlier. These levels were high enough (perhaps too high) for the project as things were, but New Mexico had chosen a different standard. The New Mexico standard was based upon total and total

46. *Ibid.*, p. 4. The net increase in wetlands was also disputed by the USFWS, US Army Corps of Engineers and USGS. The exemption was supposedly given at the time of the 1980 appropriations, falling under §404(r), yet BuRec never qualified for any permits or exemptions.

recoverable levels for mercury and selenium, and that changed the appraisal of water quality indexes considerably. As New Mexico stated, “Therefore this [BuRec’s] Assessment intentionally rejects the New Mexico water quality standards for selenium and mercury...”(47)

Throughout the 1996 FSEIS appendix for soils and trace elements, BuRec had referred to geometric means as the standard level for selenium in the project area. What this measure of sampling tended to downplay were the individual occurrences of high levels of the element, as it would only take a few point sources of selenium to increase the total load in ALP waters. Rather than take the geometric (or even arithmetic) means for selenium levels, New Mexico’s methodology was to take the highest possible level from any individual sample. The problem was not simply a dispute over constitutive values of methodology, because preferences were never addressed. Rather, BuRec simply attempted to compare geometric means of sampling levels to the EPA standards, even though doing so completely negated and ignored the purpose of the New Mexico levels. And in many cases, necessary information was not even included in the assessment.

The maximum concentration of dissolved selenium was 20 $\mu\text{g/l}$, equal to the New Mexico acute water quality standard for total recoverable selenium and 10 times the New Mexico chronic standard. This concentration is also 10 times the level determined to be potentially harmful by the US Fish and Wildlife Service. It is not possible to estimate the level of total selenium at the time this sample was collected, since ranges of percentages of trace metals in the dissolved fractions are

47. State of New Mexico. 1996. Letter from Steven Pierce (Program Manager, Surveillance and Standards Sections, New Mexico Environment Department) to Charles Calhoun (Regional Director, Bureau of Reclamation) concerning revised comments on the Final Supplement to the 1980 Final Environmental Statement to the Animas-La Plata Project. 25 November 1996, p. 6.

given only for the La Plata River. The maximum concentration of dissolved mercury was 0.5 $\mu\text{g/l}$, 42 times the New Mexico water quality standard for total mercury. No other dissolved trace elements reportedly exceeded the EPA aquatic life criteria in the Animas River. However, no raw data are included, so no actual comparisons can be independently made.(48)

The information that was included did not lend much confidence to the predictions used by BuRec.

In one example, sample selenium and mercury levels taken as part of the Water Quality Appendix studies were not included in the average. Samples taken from near Jackson Lake and Farmington, New Mexico were considered too high, and so were not even included in the mean levels indicated for those areas. Sample mercury levels were from 0.37 to 0.39 $\mu\text{g/l}$, more than thirty times the New Mexico chronic standard, while selenium levels were sampled at 216 to 236 $\mu\text{g/l}$, over 110 times the New Mexico chronic standard. Had the sample been included in the study, the level of selenium would have increased to between 18.6 and 28 $\mu\text{g/l}$ for both sites (in contrast to 6.9 and 12.0 $\mu\text{g/l}$, respectively), higher than even the less stringent EPA standards.(49)

In addition to this inexplicable error of direct omission, the Appendix also admits high levels of uncertainty regarding its prediction of contaminant levels in the rivers. When comparing the differences between calculated and observed levels of mercury and selenium, BuRec's calculations underestimated observed levels of selenium by as much as 93 percent. Mercury levels were overestimated by as much as 215 percent. New

48. *Ibid.*, p. 9.

49. US Bureau of Reclamation. 1996b, *op.cit.*, p. B-22.

Mexico's Environmental Department stated in response that, "It is disturbing that, after demonstrating how poorly the calculations predict current conditions, the Bureau of Reclamation bases all predictions of future contaminant levels on these same calculations."⁽⁵⁰⁾ It is perhaps not surprising that these same models were used to predict low levels of selenium as a result of the project.

As predicted in Chapter 3, raw evidence and uncertainty is lost as it is passed through organizational processes, leaving only conclusions which are difficult to refute independently. It is reasonable to assume that most people, faced with the decision of making a choice of whether or not to build the Animas-La Plata project, would not have the time or resources to make lengthy investigations. The decisions for ALP were largely meant to be based upon summaries of conclusions which, by the time they became summaries, did not necessarily reflect the uncertainty and risk inherent in the project.

Even a short tour through the ALP document trail can reveal how this is achieved. Observant readers will note that the state of New Mexico listed the highest total dissolved selenium level for the project site to be 20 $\mu\text{g/l}$, and this came from a report criticizing a Bureau of Reclamation environmental assessment. Yet earlier, the same BuRec environmental assessment was quoted which stated that the highest *occasional* (acute) level would be only 2-4 $\mu\text{g/l}$.⁽⁵¹⁾ The assessment of 20 $\mu\text{g/l}$ was tucked away in an attachment to an appendix to the supplement to the final EIS, a report drawn up by the US

50. State of New Mexico. 1996, *op.cit.*, pp. 11-12.

51. US Bureau of Reclamation. 1996b, *op.cit.*, p. B-167.

Biological Service.(52) No indication was given by BuRec for the discrepancy, but even more problematic, any mention of heavy trace metals disappeared entirely in the executive summaries. The only oblique reference to such hazards in the Summary of the Draft Supplemental EIS came under the subheading “Water Quality Commitments”, where BuRec claimed that it would address concerns related to sediments or “. . .other water quality constituents. . .”(53) The 2000 FSEIS listed (average) selenium concentrations of 1.2 $\mu\text{g/l}$, and considered these levels to be “less than significant.”(54) The Executive Summary completed after the 2000 Final Supplemental EIS made absolutely no mention of the matter.(55)

The omission is partly because such conclusions were hidden from view, and in cases directly contradicted the evidence used elsewhere in the assessments. The 1996 FSEIS did not contain any numerical value for selenium or mercury levels, but merely referred to studies and tabulations completed within the appendix. In the case of mercury and selenium, the conclusions drawn from the FSEIS were often entirely different than those drawn from the supporting documents. Despite the problems in methodology

52. Susan Finger. 1995. *Contaminant Impact Assessment of the Animas La Plata Project*. Prepared by the National Biological Service, Midwest Science Center, for the Bureau of Reclamation. October 1995, p. 27.

53. US Bureau of Reclamation. 2000b. Animas-La Plata Project; Summary of the Draft Supplemental Environmental Impact Statement, p. S-65.

54. US Bureau of Reclamation. 2000a. Animas-La Plata Project; Final Supplemental Environmental Impact Statement, p. 3-44.

55. US Bureau of Reclamation. 2000c. Animas-La Plata Project; Final Supplemental Environmental Impact Statement, Executive Summary.

criticized by New Mexico's Environmental Department, the two appendixes relevant to these trace metals both indicated that increased levels of the elements would occur as a result of ALP.⁽⁵⁶⁾ The 1996 FSEIS, however, concluded that "operation of the Project in conjunction with the proposed mitigation activities would not cause any significant change in water quality." At one point, BuRec concluded that total selenium levels would actually decrease with operation of Animas-La Plata.⁽⁵⁷⁾ These conclusions were apparently used again in the 2000 FSEIS, although this assessment still relied largely upon the 1996 assessment appendixes and attachments.

As a result, one would have to wade through literally thousands of pages of documents to find the concerns raised in relation to mercury and selenium; the Bureau of Reclamation certainly did not highlight the issue. In response to the state of New Mexico, BuRec merely promised to monitor mercury and selenium levels in and near the project site, although it is difficult to understand what this would accomplish. If evidence already exists that the levels of these metals are too high, then further evidence after construction would be of little assistance.

There is no proposed plan of action should such unacceptable conditions occur. In fact, once the Project was completed, there would be few mitigative efforts that could reduce the selenium concentrations from irrigation return flows except for removal of additional project lands or the treatment of irrigation return flows. The purpose of the environmental impact process is to avoid these effects during the

56. US Bureau of Reclamation. 1996c. Animas-La Plata Project; Final Supplement to the Final Environmental Impact Statement, Appendix F: Soils and Trace Element Analysis.

57. As quoted in: State of New Mexico. 1996, *op.cit.*, p. 16.

planning phase prior to any construction.(58)

This is essentially the same point that the EPA made several years earlier, that mitigation is not feasible or practical. It is vital to understanding this process to note that the 1996 FSEIS was created in response to the inadequate draft version rejected by the EPA in 1992. Because of negotiations related to federal obligations to provide Native American tribes with long-due water rights, the EPA never had the chance to officially review the 1996 version.(59) By the time the 2000 version was released, proponents had focussed on a way to prevent any further review of ALP's possible environmental impacts.

Resolution of the Animas-La Plata Project

The Final Triumph of the Political?

In 1988, the Southern Ute Indians and Ute Mountain Ute Indians concluded negotiations with the US government on quantification of their water allocation rights. These water rights (codified under the Colorado Ute Indian Water Rights Settlement Act of 1988 [Public Law 100-585; 102 Stat. 2973]) were to be awarded on the basis of what is known as the Winters Doctrine. Named after the 1908 court case *Winters v US*, it established that Indian tribes often have water rights which are senior to those of all other users on the river. The settlement act of 1988 was a way of codifying how much water

58. *Ibid.*, p. 13.

59. Five review extensions were given, only to end when Colorado asked that federal studies be made into possible alternatives to ALP.

was owed to the two Ute tribes, and the Animas-La Plata project was quickly seen by some as the best and most immediate way to fulfill those obligations. The settlement served more than just the Utes' interests, though.

As ALP came under more intense scrutiny and criticism, both from non-governmental opposition and a number of departments within both the US and state governments, the Ute Settlement Act became a way for non-Indian plan proponents to avoid discussion of the economic/environmental requirements for the project. Justifications for the project continually changed since its authorization in 1968. The first justifications emphasized economic benefits to the region, an argument not believed by auditors in the Budget Bureau, who required a slightly redefined rationalization provided by Dan Dreyfus. BuRec seemed to distance itself from such numbers over the years, however, and by 1980 it was openly arguing that cost-benefit analyses were inappropriate for environmental impact statements.⁽⁶⁰⁾ Into the 1980s, BuRec grudgingly admitted that its CBA numbers were not all that they had appeared to be, and as a result the local area and state of Colorado had to enter into cost-sharing agreements to make up the difference. From a pre-authorization high of 1 to 1.89, to Dreyfus's 1 to 1.11, by 1986 the internal BuRec numbers had fallen to 1 to 0.7.⁽⁶¹⁾ At the time of the Department of Interior's internal audit on the project in 1994, the numbers had fallen even lower.

60. See the response by EPA to such arguments in: US Environmental Protection Agency. 1980. Letter from Roger Williams (EPA 8th Region Administrator) to Al Jonez (Director, Office of Environmental Affairs, Water and Power Resources Service, US Dept. of Interior). 12 August 1980.

61. US Dept. Interior. 1986, *op.cit.*

The environmental analyses suffered from similar problems. Most of the EPA's criticisms of the original 1980 EIS were made in reference to the project's economic analyses. Higher salinity of the water was identified as a concern, but generally only insofar as it caused damages to agricultural and municipal supplies downstream. The next EIS in 1992 met with highly critical reviews from EPA and USFWS, whose concerns with water quality and endangered species had been significantly heightened over the previous twelve years. Even while trying to rectify the criticisms of the 1992 draft, New Mexico threatened to halt the entire project after release of the 1996 FSEIS. Not only was the Animas-La Plata project becoming more and more costly, even to the casual observer, but its claims to be environmentally benign became ever more indefensible.⁽⁶²⁾

The use of Indian claims to help support the Animas-La Plata project were not new, and could be traced back to Congressional hearings as early as 1966. Their inclusion seemed to grow ever more important, however, the more difficult it became to justify ALP as a normal irrigation project. Throughout the advanced planning and decision-making processes of the 1970s, inclusion of Indian water became the primary objective of the project, particularly after President Carter's efforts to summarily cancel water projects containing questionable economic benefits. Arguing that ALP was necessary to support benefits to Indians, Animas-La Plata was excluded from Carter's 'hit list'. Yet the project met with difficulty yet again when new budget rules were implemented under the Reagan administration. During the Reagan terms, federal projects such as ALP required up-front

62. At the same time as the now infamous "Someone else pays the bill" advertisement in Durango in 1987, a similar advertisement was released claiming that ALP would help *improve* the environment.

cost-sharing from local sources, which was very difficult to meet under the balanced budget amendments to the Colorado constitution.(63) As a result, Colorado pressed the case that Animas-La Plata was entirely a federal project, and the best way to achieve that was to claim that it was necessary to fulfil obligations to Indian water rights. The 1988 Settlement fit this need very nicely.(64)

Some questions exist as to the validity of the Ute's claims, due to the fact that the Ute's claim senior rights dating from 1868, yet their reservation did not technically exist until much later. It is beyond the purview of this research to pass judgement upon the legalities of the issue, but it is reasonable to assume that the Settlement was far more than a cynical ploy by either side on the ALP issue.(65) What is of interest is the way in which, since 1988, the Indian issue has been used by non-Indian proponents to claim exemption from either economic or environmental analyses of their proposed plans. As early as 1986 (the year in which agreement was reached between the Utes and the Colorado government), the Bureau of Reclamation stated,

It is the policy of the Bureau of Reclamation to build only economic projects. Because the benefit/cost ratio for the Animas-La Plata Project is only about .79 to one. . . it is inherently uneconomical. However, in recognition of the importance

63. See Decker. 1991, *op.cit.*, p. 9.

64. See Bill McDonald. 1988. Letter from Bill McDonald (Director, Colorado Water Conservation Board) to Colorado Governor Roy Romer. Center for Southwest Studies, Fort Lewis College, Durango, Colorado, 4 October 1988.

65. The argument against the Ute's claim can be found within James Hamilton. 1997. *Southern Ute Water Rights and the Date of Reservation Under the Winters Doctrine*. Unpublished legal brief. Center for Southwest Studies, Fort Lewis College, Durango, Colorado, 30 September 1997.

of settling the Indian claims associated with the Animas-La Plata Project, the Administration is willing to go forward with project construction if local project sponsors will assume the responsibility of bringing the benefit/cost ratio up to unity...(66)

This argument has since been extended to cover all aspects of the plan, including negotiation of cost-sharing, which in recent years has been kept secret.

Redefinition of the Project and Shift to the Political

This form of justification only worked to a degree, however, for it was difficult to explain to decision-makers in Washington why the original irrigation portion of the project should be kept if the only purpose of the plan was to provide water to Indian tribes. With questions on water quality persisting, the Clinton administration forced a further sizing down of the project size, from what had been termed 'ALP Lite' in the late 1980s to 'ALP Ultra-Lite'. At least, that was the way things appeared, although the motivations behind both the Indian justification and the specific alternative proposed had more complex origins than mere altruism. Part of the reasoning comes out in the Congressional testimony of Deputy Secretary of the Interior Hayes.

And most importantly, it [ALP] will finally resolve the Ute Tribes' water rights. We think that is important not only because of the trust responsibility that we owe to the tribes, but also because resolution of those water rights will avoid the uncertainty of water rights in the entire Southwestern Colorado and Northern New Mexico area. If we do not bring closure here, the Settlement Act of 1968 will go by the wayside, litigation will commence, and potentially very significant senior water rights claims will be brought against current non-Indian water users in

66. US Dept. of Interior. 1986, *op.cit.*, p. 2.

Southern Colorado and Northern New Mexico.(67)

Construction of ALP was supported by locals for reasons that went back to the original fears of Aspinall at the time of the Central Arizona Project. If the government was unable to meet its obligations to Indian tribes on time, they could take the US back to court and water rights could be taken from existing non-Indian holders. Whatever happened, the local proponents in southwestern Colorado and northwestern New Mexico did not want to lose water rights, and ALP was still the best way to achieve that goal.

The shift to a more political debate was what emerged in Congress, and few people were willing to vote against a project ostensibly designed for Indians.(68) 'ALP-Lite', a version of the project only slightly smaller than the original, only failed to pass because of stern resistance of other federal agencies and non-governmental groups, who repeatedly pointed out that BuRec had failed to adequately address environmental impacts of the projects. In the hopes of bypassing these increasingly obvious flaws, one senator from Colorado introduced legislation that would provide 'sufficiency' language to ALP, effectively saying by fiat that the project was environmentally and economically sound, and could not be brought to court at a later time for inadequacies.(69) This effort

67. US Congress. 2000. Hearings on H.R. 3112. Subcommittee on Water and Power, Committee on Resources, House of Representatives. Washington, DC, 11 May 2000, p. 12.

68. The five US senators who did vote against the project were heavily criticized in Colorado for latent racism.

69. See US Senate. 1998. Hearings on Senate Bill 1771, Select Committee on Indian Affairs and Subcommittee on Water and Power, Committee on Energy and Natural

(continued...)

failed as well.

Yet in the 1999 Draft FSEIS, BuRec again attempted to shift debate away from the impacts of the project and focus instead upon obligations to provide water. In addition, by claiming that the water use by the Ute tribes would be indeterminate, falling under 'Nonbinding Use Scenarios', BuRec could avoid close examination of project impacts by the NEPA and Clean Water Act. Such scenarios exist where water is provided to the tribes, but they are not obligated to use the water in any particular fashion. The 2000 FSEIS only identifies several possible future uses for water, including such projects as a coal plant or golf courses.⁽⁷⁰⁾ Yet as the potential projects are not actually known, neither are their respective impacts. Essentially, this means that the Ute's allocation, enough to provide municipal water to 400,000 people, would not be evaluated based upon its potential impacts nor its economic benefits. BuRec claimed that since ALP was (and supposedly, always had been) a unique project, it did not fall under the same legislative scrutiny as other projects.

The project that was finally passed by Congress was a scaled down version of the original, with projected costs of one-third, all irrigation removed to non-Indian users, and only a fraction of the total water withdrawals allowed. Of the 57,100 acre-feet permitted by USFWS, one-third of that water is to go to M&I users in cities like Durango and Farmington, while the rest is slated for the Ute tribes. The Ridges Basin reservoir will be

69.(...continued)
Resources, Washington, DC, 24 June 1998.

70. US Bureau of Reclamation. 2000a, *op.cit.*, pp. 2-3 - 2-13.

smaller, with no recreational facilities, and the Southern Ute reservoir will not be built.

Yet again, this is slightly misleading. Because of the cost-sharing agreements, the construction of ALP is divided into two phases. The first, almost fully funded by the federal government, is to build only the Ridges Basin Reservoir and pumping station from the Animas River. Water rights (and money for water development) would be provided to the Utes in contract, yet there would be no way in Phase I to deliver the water. This would not come until the second phase, which is meant to be funded by local sources.(71)

The original plan proponents, including Hayes (quoted above), apparently still intend to build the original ALP design as part of Phase II. By constructing the reservoir and dam so that it may be expanded, they can not only commit the US government to funding much of the full project (which will likely meet with cost overruns even if the plans are not expanded), but also avoid environmental and economic analyses in the process. Plans to complete the full project have been alluded to in public(72), but are seen more clearly in minutes to negotiating meetings that had been kept closed to the public.(73) It is unlikely that this continuation of the original project will proceed without conflict, and substantial doubt remains as to the ability of the project to abide by state and

71. The cost-sharing agreement places caps on local and tribal commitments, meaning that any cost overruns will be covered by the federal government.

72. See US Senate. 1998, *op.cit.*

73. Earthjustice Legal Defense Fund. 1999. Freedom of Information Documents released from the Department of Interior, Civil Action No. 99-WM-808, June 1999. The meetings referred to took place in September 1998, between project proponents and Administration officials.

federal environmental regulations.

What is remarkable at this stage, so many years after the Animas-La Plata Project was first proposed, is how the justifications have attempted to rely less and less upon scientific and quantified knowledge. The Bureau of Reclamation has always attempted to downplay the importance of the economic and environmental assessments, but by 1998 its supporters were attempting to argue that regards of the regulations, regardless of what the experts say, the project is still necessary. In many ways this is an encouraging sign, despite the ability of the project to pass Congress. It means that the debate has shifted from attempts to hide true motives under technical language. The true motives for the project might still be masked, but it may ultimately prove easier to debate the issue in political terms than technical ones.

Administrative Technicism and Bias Values

The Bureau of Reclamation continually attempted to justify its actions in terms of neutral, technical knowledge, and even in the end it was required to continue to do so by the NEPA and associated legislation. Its efforts to do so were never entirely successful. By the time the Animas-La Plata project came under review by the federal and state governments, political action had codified acceptable levels for environmental damage, and had legislated a process whereby final determination of what constituted acceptable methodologies was not up to the developing agency, itself. Of course, just because an environmental assessment is considered acceptable does not mean that it is scientific; assessments and scientific methodologies are evaluated for different reasons and by

different criteria.⁽⁷⁴⁾ Yet the existence of public debate on the issues, including what constitute appropriate methodologies for inquiry, allows for the necessary critical questioning and doubt needed for science.

BuRec attempted to do otherwise. Its economic methodologies were entirely fraudulent at first, and it was not until the second half of the 1980s that it was forced to admit that it could not justify the project on economic grounds. Its environmental assessments were consistently vague, its mitigation commitments often missing, and its conclusions entirely misleading. The political context of the Bureau meant that even those assessments completed under mainstream scientific methodologies by independent experts would be injected with bias values of the agency by the time that such information was passed along into policy-relevant form. In no area was this more true (and more disturbing) than with selenium and mercury contamination issues. Yet it remained the case that in all areas where other agencies or non-governmental groups expressed concern and could find reasonable arguments to question the project, BuRec insisted that no impacts were significant, that everything could be effectively mitigated.

The Animas-La Plata project is perhaps one of the best examples of how administration fails to take science seriously, and how it fails to foster its necessary environment. It is highly unlikely that the project would have been able to survive absent the justification of the project as part of the Indian water-rights obligations. Yet the constant efforts to maintain an illusion of scientific justification gave every indication that

74. See Kristin Shrader-Frechette. 1985. *Science Policy, Ethics, and Economic Methodology: Some Problems of Technology Assessment and Environmental Impact Analysis*. Dordrecht, Netherlands: D. Reidel Publishers, p. 12.

nothing substantive existed behind those pronouncements. The existence of mandated science in the US system and the relatively open political environment called for by the NEPA made many efforts at goal displacement and bias transparent. The existence of these measures helps to explain why the Animas-La Plata project was held in check for so many years, while quite similar projects were built without question even as late as the 1970s. Public administration may not have been able to foster science by itself. Yet an open and contentious system helped to force the administrative processes to change, or at least to resort to different tactics in pursuit of justifying its goals.

Conclusion

Chapter Seven

Reassessing Science for Environmental Policy

A popular government without popular information, or the means of acquiring it, is but a prologue to a farce or a tragedy, or perhaps both.

- James Madison

Improving Policy

Where to go from here?

The relationship between science and administrative government, particularly as it applies to environmental policy, is neither a harmonious one nor a matter easily solved. In the earlier chapters it was argued that policies could not be based upon claims to a value-free knowledge, that apolitical rationality could not be created simply in reference to scientific research. To complicate matters, however, much of what passes for science in administration is not, by nature of accident or design, scientific. However, it is not enough simply to claim that science and administration are antagonistic to one another, that the cynics are always correct in assuming that government is attempting to falsify information and cover up dangerous information. There remains the important question of what to do next, of how to improve matters that have not been resolved. It was not my intent simply to criticize in this research. One must also be able to evaluate the difficulties present in contemporary environmental politics. This chapter will summarize many of the

administrative problems related to use of scientific or technical information, and will conclude with the lessons learned from this thesis, and what might be done to improve matters in the future.

One can begin evaluation of environmental decision-making in Western countries proceeding from the assumption that administrative states (or bureaucracies) have inherent difficulties in producing suitable policies. This indicates a frustration of a general nature, for neither environmentalists nor dam proponents are entirely happy with how environmental policies have developed since their introduction in the 1970s. For environmentalists, the very fact that dams have been built is the source of frustration. For the developers, the presence of environmentalists and their use of emotive arguments, rather than economic ones, is frustrating. By 'suitable', one should not be misled into thinking that policies are possible wherein all parties are equally content, for this remains a myth of earlier positivist thought. Rather, by suitable I simply mean a policy where it is possible to maintain some semblance of scientific thought, where neither doubt nor consideration of alternatives are lost.

There are sound justifications for the opposition to dam and irrigation construction, and such arguments can be made in reference to a number of viewpoints. As was detailed in all three case studies, the environmental effects of large dams are extensive and irreversible. This applies both to those areas which can be commodified (such as the loss of commercial fisheries) and those that cannot (loss of scenic habitat). And although it is true that many benefits of dams cannot be provided without some form of environmental damage, these are value judgements which often cannot be made

through traditional cost-benefit analysis. If, for example, the benefits of a large dam are made on the grounds that hydro-electric power will be produced more cheaply and environmentally than coal plants, this focus on a simple 'either or' answer sidesteps broader questions of energy conservation, utility pricing, and alternative power generation. These 'non-structural' alternatives must be explored more fully if policies are to reflect more than a few select possibilities. Dams and irrigation projects also produce effects which are highly difficult to quantify, and the results produced by CBA models are highly dependent upon the specific model chosen for use.

The construction of large dam projects is also an area that does not have its opponents solely within one area of the political spectrum. On the contrary, motives for dam opposition can be many and varied, and justified upon grounds which may seem largely contradictory. In the United States, support for large dams was traditionally associated with the Democratic party and its own history of New Deal construction projects. Opposition to these dams then came not only from a number of Republicans, who disagreed with the enormous government expenditure on such projects, but from environmentalists within the Democratic party. In Norway, opposition to dams was linked with concern for minority rights of natives in the north. Hungarian motives were partly directed by opposition to Communism, and also in connection with support for Hungarian nationalism.

When we claim, then, that environmental policy in water resources management must be improved, the condition for accepting policy as more suitable rests upon a need for balance. This balance must exist between the decreasing marginal benefits of new

dam projects, and the needs of the environment and people affected by its construction. Projects should not exist solely for political benefit, or to provide subsidies to those companies and utilities involved in construction and operation of the dam. These projects should be made more transparent, reflecting both the environmental protection values of legislation in those countries, as well as being sensitive to the concerns of affected populations. Such observations no longer apply to the specific countries involved in the case studies, for dam construction in these areas has slowed to a virtual halt. Yet this is mainly due to the lack of suitable sites, not for lack of resolve. The US and Norway, at least, remain major exporters of hydroelectric technology, aid and assistance to other parts of the world. Their experiences reflect upon the choices they present to industrializing countries, where many of the same problems are becoming apparent.⁽¹⁾

These points, and those that follow, are made with a particular argument in mind. The concerns of transparency, public involvement and integrity of scientific research are all interrelated, and it is not enough to say, for example, that policies can be made more rational simply by developing better science. Rather, we must come to terms with both the conflictual nature of politics and the uncertain nature of scientific knowledge. Diverse interests must be both heard and tolerated (the definition of Popper's 'Open Society'), science may be able to elucidate the consequences of various policy options, and the science itself must be open enough that it cannot be controlled or subverted by any one agency. Otherwise, political actors will continue to mask their values and choices behind

1. See Ann Danaia Usher. 1996. "Damming the Theun River: Nordic Companies in Laos." *The Ecologist*. 26, 3, pp. 85-92.

technical language and claims to scientific validation. Such efforts remain both dishonest (the process of goal displacement described in Chapter 3) and portray political debates as black-and-white, win-lose scenarios at all times. Policy and science, in order that they be improved, must move beyond these limitations and concerns, abandoning the ideal of perfect, technical/scientific rationality in favour of a government structure that preserves diverse interests.

Specific Concerns

Closed Technocracies

In general, many problems with environmental policies can be traced back to administrative rules and forms of governance. The model of a quantified world, one that can be known and controlled by wise and knowing agents on behalf of others, remains strong and is reinforced by tradition. The first and overriding concern for environmental policy is thus that those most affected by the impacts of policies, are often the same people with the least ability to control events. Policies are often closed to input from affected groups, relying instead upon the stewardship ethic of technocratic legitimacy and expert judgement. Dams may create severe consequences upon the livelihood, health, and well-being of people who live in the site area and downstream, and to ignore such considerations is to create policy which is inherently undemocratic. Indeed, the long history of dam building in Western countries (and at least as much in non-Western countries) has shown a preference for building reservoirs upon indigenous or peripheral

lands, in order to provide water for those who were already fairly wealthy.(2)

Although a more open process may ultimately decide that the benefits of the project outweigh negative effects, summarily to ignore environmental and social concerns is not tenable, and greatly harms any pretense of democratic legitimacy. The chosen case studies illustrate how state defence of unpopular projects can damage the legitimacy of both the government and the science it uses to argue its case. At the very least, citizens must be able to believe that their government will not violate their own regulations for both due process (including data management) and environmental quality. The Soviet Union may have had strict environmental standards for such areas as water and air quality, but the inability or unwillingness to enforce such laws did not lend much legitimacy to the state. It is problematic when governments in the US, Canada or the UK are found to be violating their own laws, making exceptions for their own policies, or simply arguing that such standards do not matter.(3)

Mixed messages are all the more damaging when little input is allowed into the process. Oftentimes the issue is not as clear as it should seem, and conflicting lines of authority, poor communication and mutual misunderstandings can wreak havoc with the notion that one should simply obey the rules. For the Animas-La Plata project in the US,

2. See the histories within : Robert Gottlieb. 1988. *A Life of Its Own*. San Diego: Harcourt Brace Jovanovich; Donald Worster. 1985. *Rivers of Empire*. New York: Oxford University Press.

3. Typically, governments are the largest single polluters in any given country, and exemptions from environmental regulations (such as for the military) maintain such conditions. See, for example, Michael Renner. 1991. "Assessing the Military's War on the Environment," in: *State of the World 1991*. L. Brown, et. al.(eds.), New York: Norton, pp. 132-152.

for example, legal wrangling has caused enormous confusion.

In the courts, lawsuits are in play: three against the Bureau by opponents, and one against the EPA by proponents. A court injunction intended to protect archaeological resources forbids the Bureau to move dirt; a congressional directive orders the Bureau to immediately move dirt.(4)

When such confusion comes as the result of open debate, it may be welcome, as it may then force consideration and debate among alternatives. If confusion results because citizens are not allowed access to information, distrust and suspicion may be the only results. The public may be led to believe that something is wrong with the information, for distrust of any government statement may be the only defense when information is kept among elites.

Poor Data Management

When governments claim that they are acting 'according to science', while local knowledge or independent research shows otherwise, suspicion may be warranted. The use and misuse of environmental/scientific research is the second major concern in improving environmental policy. Water resources management is often plagued with poor data collection and the use of inadequate methodologies, despite claims to the contrary. Even those scientists who attempt to provide the best possible evidence may be constrained by severe time limits, inadequate funding, and administrative interference. Their work is often reinterpreted as it is passed along in organizations, so that the

4. Ed Marston. 1996 . "Cease-fire called on the Animas-La Plata front." *High Country News*, 11 November.

conclusions little resemble what the original evidence suggests. What then passes as 'science' in policy discussions may be little more than administrative mimicry of such research.

Scientific mimicry lies at the heart of this research, for even if the technocratic models are correct in applying science to political questions, the actual science is often missing. This can occur without anyone realizing it, despite the best efforts of highly competent and well-intentioned government employees. The problem, as mentioned in Chapter 1, is that intentional fraud by the government is really only part of the trouble. While the information used to make decisions within government is often of a poor quality, the reasons why it remains poor is not simple enough to be left to conspiracy theories. At times the data may be tampered with intentionally, yet ultimately, the problem is political. It therefore requires a reassessment of how we approach science in policy.

Lack of Oversight

The problems associated with poor data management may be traced to the third issue in resource management policy, that of conflicts of interest in evaluating evidence and policy. Almost all large dam projects have environmental assessments carried out by the same (or closely related) agency directing the project. This leads many to suspect that environmental assessments are little more than policy justifications, post-hoc bureaucratic exercises undertaken to defend decisions already made. As discussed in Chapter 3, such use of environmental (policy) assessments weakens the authority and substance of

scientific evidence and methodologies, nor does it allow for policy to be changed after construction has begun. The combination of poor research and the conflict of interest in carrying out such research has led many to conclude that science has little to offer to environmental policy.⁽⁵⁾ Certainly it would have been difficult to rely upon science in the case studies illustrated in this research, at least the 'official' science used by the developing agency.

As this research argues, however, science does have a great deal to offer if proper measures are taken to ensure its oversight. As the water management agencies in the case studies constructed science to fit their preconceived goals of dam construction, the validity of their scientific processes could (and certainly should) have been questioned. Such an interjection of doubt is a precondition to scientific research, and it is only proper that the basis for such questioning should come from alternative scientific (in the sense that also includes empirical local knowledge) theories and findings. Thus the role of science should not be to settle all doubt, but actually to *provide* it.

Responsibility- Avoiding Goal Displacement

The acceptance of uncertainty does cause political problems, however, especially in regards to accountability. The final consideration in terms of policy improvements must be that those who create such policy be held accountable for their actions. The popular tactic of claiming that a project has been justified upon 'scientific' grounds, does

5. For an example of this view, see David Collingridge & Colin Reeve. 1986. *Science Speaks to Power*. London: Frances Pinter Publishers.

not adequately explain the goals inherent in arriving at such a justification. In many cases, the use of technical information is only convenient when it masks political motives, and is a way to stifle debate on the subject. Yet if science can open up debate, if it can cause doubt and raise uncomfortable questions, this can elevate the authority and utility of the political debate. If science alone cannot solve a problem and provide convenient policy conclusions, then political actors must be relied upon to accept responsibility for their actions. Otherwise, one may find the situation as described in Chapter 3, where the collapse of the Teton Dam in the US is simply termed an 'accident', regardless of any available evidence of negligence by BuRec. Ultimately, the evaluation of goals versus consequences is a political decision, and those in authority must be held accountable for such judgments.

Accountability does not simply mean holding individuals legally liable for their actions, but in recognizing that institutions and organizations can be largely guilty for actions, as well. In assessing the matter of guilt over the Chernobyl explosion in 1986, Grigori Medvedev argued that the nuclear engineers at the plant were responsible for the actions that led to the accident. But he went on to say that the general lack of competence found in the Soviet nuclear industry and the Soviet atmosphere of secrecy and disregard for safety was a reflection upon the system, itself.⁽⁶⁾ The deaths and illness caused by the accident could not then be traced only to specific individuals, but the nuclear institutions in the former USSR were just as directly responsible for those events.

6. See Grigori Medvedev. 1991. *The Truth About Chernobyl*. New York: Basic Books.

Ways to Improve the Process

In order to account for these deficiencies, a number of recommendations may be appropriate. To varying extents, such proposals have already been implemented in a number of countries, and the final outcome of dam projects in the case studies described here is partially the result of such influences. The National Environmental Policy Act (NEPA) in the United States, for example, prescribes a system of mandatory environmental impact assessments (EIA) for federal projects which have the potential to significantly impact the environment. The use of such EIAs is promising, but often the use of such assessments in practice leaves much to be desired. The experiences detailed in the case studies provide ample evidence of such shortcomings.

The case studies do diverge in their outcomes, however, and these attributable differences may offer greater guidance to those attempting to address such administrative problems. The Alta Dam was built, Bős-Nagymaros was abandoned by Hungary, and the Animas-La Plata project was approved by the US but may still exist in the same political stasis for some time to come. Although all three countries experienced the injection of bias values and goal displacement into the scientific process surrounding the projects, these differences in outcome do hold some importance. The collapse of the Hungarian government puts some obvious doubt into the ability to predict what would have happened with Bős-Nagymaros, but it may be safe to say that support for the project was collapsing at the same time as the communist government.

The Need for Official Access

The Alta Dam was one of the most sheltered from criticism, despite the protests and the democratic nature of the Norwegian government. As the criticism of Alta was largely unofficial, coming from groups which had neither the respect of the government nor much legal standing in the process, information justifying the dam proposal was easy to control. The government refused to fund research projects which would have been critical, and those that were could be compartmentalized from the decision-makers. Most of the assessments were carried out by NVE itself, and no advisory boards existed to provide alternative views or solutions to the prime minister. As far as the Storting was concerned, those who were critical of the project were simply trouble-makers, and the government undertook considerable effort to attempt to silence them.

As the Storting's president Guttorm Hansen stated in *Arbeiderbladet* in 1980, "Actions like these constitute a danger to our democracy if they prevent society from carrying out legal decisions made by democratic institutions."⁽⁷⁾ Legitimate questions are raised by Hansen, but the most important point in this research is to ask whether a society has the right to have access to and is given the ability to question studies that the government terms 'scientific'. Without official input into the process, any views that diverge from that of the state may be viewed as subversive.

This contrasts greatly with the experience of Hungary. Although a closed system at the time, it nonetheless contained the ability for critics to voice their views. In

7. As quoted in: Borring, et.al. 1981. *Alta i Bilder: 12 års kamp for Alta-Kautokeinovassdraget*. [Alta in Pictures: the 12 year struggle for the Alta-Kautokeino Waterway] Oslo: Pax forlag., p. 79.

attempting to justify the project, the central government in Hungary attempted to rely upon scientists and economists in the Academy of Sciences (MTA), most of whom had no direct interest in seeing the project built and were well aware of the environmental dangers involved. Had Vargha alone attempted to discredit Bős-Nagymaros he would have been quite unsuccessful. His success lay in the ability to convince other scientists, people with influence in the process, to voice concerns and perhaps join the Duna-Kör. Although the government could prevent direct research on the project, the area was already well known and this was sufficient to allow crucial questions to be raised.

The Hungarian government's approach also failed because it had difficulty adapting to shifting justifications for the project. Unlike Alta, where the Norwegian state could simply suppress information on energy predictions and environmental effects, and the United States, where Indian water-rights obligations came to paper over deficiencies in the economic and environmental impacts, the Hungarian water management supporters could not provide a good enough reason to build the project. The proponents simply attempted to suppress all criticism, rather than directing it in certain areas. This top-down approach did not work very well, for the extreme efforts the government took to silence critics gave the impression that the state had something to hide.

The tools of repression were all out of proportion to the weight of the opposing opinions: and it was precisely this that betrayed the plan's partisans' fear that the system, improvised with such difficulty as it was, might reveal how weak their base was.⁽⁸⁾

8. Tamás Fleischer. 1993. "Jaws on the Danube: Water Management, Regime Change and the Movement Against the Middle Danube Hydroelectric Dam." *International*
(continued...)

The Hungarian government never had adequate control of the official part of the debate, and the doubt caused by environmental groups like Duna-Kör gave the impression that alternatives might be possible, even necessary. The process was not as tightly-knit as it was in Norway, perhaps because the Hungarian government was not accustomed to having to justify its policies to its citizens. Those attempting to instead suppress information met with a perplexing dilemma.

. . . [A]s long as the population's right to know about matters relating to the environment remained unrecognized, naturally organizations could not be formed to control the activity from above. The authorities thus had simultaneously to take the first steps to acknowledge the existence of environmental problems, while denying the existence of the movement which had formed below.(9)

The government had either to attempt to control the debate, or to deny the existence of any environmental problems; it could not do both. If the state denied that any environmental problems existed, then it could not set up conservation organizations to address those issues. In this case, the underground organizations like Duna-Kör would control the debate. If the state did set up official organizations to replace Duna-Kör, then it had to do so with the admission that environmentalists' concerns had some merit.

Even though the ability for critics to voice views in Hungary was not wholly intentional, its occurrence does provide some indication of how effective such opposition

8.(...continued)

Journal of Urban and Regional Research. 17, 3, pp. 432-433.

9. *Ibid.*, p. 434.

can be when taken seriously by large numbers of people, particularly those in government. If doubt can be caused in the administration itself, efforts to promote science can be strengthened. The United States provides a good example of this. The legal standing afforded to groups by the National Environmental Policy Act, among others, changes the legal landscape of a project and also tends to change the scientific nature of work done in the government. Some of the most important lawsuits brought against the government over the course of the Animas-La Plata history concerned disputes over the validity of scientific reports (including cost-benefit analyses). Furthermore, the public input allowed under NEPA to the mandated environmental assessments changed the process. Public input was able to lend credibility to the project when various stakeholder groups could claim that they were present 'at the table', as contrasted by the complaints and further lawsuits filed when such access was lacking.

The ease with which reports and documents were available for this research also attests to the different nature of American environmental politics. Both the Freedom of Information Act and others (such as NEPA and APA) allowed full access to the environmental assessments, government memos, scientific reports and all relevant documents, many of which were sent free of charge. Similar documents existed in Norway but were not accessible, while in Hungary they simply no longer existed. Such access to information allows for much greater scrutiny of government claims, and provides opposition groups with the ability to make arguments on the basis of administrative information, rather than claims that are characterized as merely 'emotive' or 'reactionary'. Freedom of information thus provides a political measure of authority to

a state's citizens, as they can debate the issues on common ground. This openness no doubt provides some clue as to why ALP has been held up for so many years, and why its justification is no longer able to rest upon arguments of scientific validity.

The Madisonian Need for Conflict

Animas-La Plata was held in check for so many years due to the conflictual nature of the US government. Rather than allowing only one agency oversight over the process (as in Norway), the US has numerous, overlapping jurisdictions on these issues. This allowed several agencies, ones without a stake in the building of a project, the ability to contest information they thought questionable. Economic analyses were challenged by the EPA and OMB, wildlife impacts by the USFWS, and selenium and mercury contamination by the state of New Mexico, USGS and the US Biological Service. This was in addition to opposition from non-governmental groups, and it forced reevaluation of both methods and conclusions of the project. Despite the strong intransigence of project proponents, the Anima-La Plata project, recently passed by Congress, looks quite different from its 1968 predecessor.

Such conflict is generally referred to as 'gridlock', and its pejorative use may mask the deeper necessity of having such a system. Arguments in favour of such frustrating and inefficient government were made by Madison in the *Federal Papers*, and much later by Charles Lindblom in *The Intelligence of Democracy*.⁽¹⁰⁾ Madison argued that the checks-and-balances system of American government would be a check against

10. Charles Lindblom. 1965. *The Intelligence of Democracy*. New York: Free Press.

tyranny, that it would prevent power from falling into the hands of any one individual or group.(11) Lindblom refined this argument by introducing the idea of incrementalism, the idea that politics was a process of compromises made over time rather than immediate resolution.(12) Such a process could ultimately prove more efficient than autocratic rule, and provided a better basis for legitimacy, as well.

Most important, such a system of government also mirrors the conditions necessary for scientific research to prosper. Writers like Popper and Lakatos thought that criticism, discussion and constant wrangling were necessary in order for scientific research to survive, to avoid what Kuhn described as 'normal science'. Constant questioning and inquiry are needed, lest the institution of science fall into the acceptance of theories as little more than orthodoxy and dogma. This is not simply the responsibility of scientists, for citizens must be aware of the need not to accept uncritically the rulings of 'experts'.(13) The implication is that science works better under a democratic system than an authoritarian one, because of the greater openness and possibility to question long-held 'truths'.

And what of those who ask how science can be so successful in countries with authoritarian governments?(14) In this case a distinction must be made between

11. These arguments are summarized in Federalists Number 10 and 51.

12. See Charles Lindblom. 1959. "The science of muddling through." *Public Administration Review*. 19, pp. 79-88.

13. See Karl Popper. 1962. *The Open Society and its Enemies*. London: Routledge.

14. In particular, this question was raised by two authors: Paul Josephson. 1996.

(continued...)

science-for-policy (alluded to at the end of chapter 3) and science-as-technology. Closed governments can be quite good at the technology end of the work, because in such conditions the goals are clear and the consequences for failure severe. A government may order that a rocket is needed that will deliver an 800 kg payload 3000 km and be accurate to within 500 metres. This is something that the engineers can do without having to involve political questions, and in both Nazi Germany and Soviet Union the lab setting was often safe from interference (although never completely safe, especially during the Soviet purges), or at the very least it was safer than the consequences of failing to provide the set goals.(15)

Attempting to solve a technical problem of this nature is easier in some respects than a problem more broadly defined. The Manhattan Project in the US worked along very closed and compartmentalized lines, yet its production of a working atomic bomb by 1945 came relatively quickly.(16) Likewise, if engineers are asked to build a dam to produce 850 megawatts of electricity, this can be framed as merely a technical problem. Never mind that many people live in the proposed reservoir area, that farmers and fisheries will be harmed, that ecologically valuable areas will be flooded, all that is

14.(...continued)

Totalitarian Science and Technology. New Jersey: Humanities Press; Loren Graham. 1998. *What Have We Learned About Science and Technology from the Russian Experience?* Stanford: Stanford University Press.

15. See Alexander V. Kalinin. 1994. "Secrets of the Soviet Nuclear Complex." *IEEE Spectrum*. May 1994, pp. 32-38.

16. For a fascinating history of how the atomic scientists worked (from Germany to the US), see: Robert Jungk. 1956. *Brighter than a Thousand Suns: A Personal History of the Atomic Scientists*. New York: Harvest Books.

important to those in laboratory settings may be the 850 megawatts. If this is the only factor of importance to those in politics then technicism and naturalistic fallacies have come into play.

This is where the quandary between open and closed systems of governments lies. The closed system may be good at the development of technology, but attempts to ignore (or imposes itself upon) the relevant politics. Authoritarian or closed systems of government can therefore be adept at developing technology, but rather clumsy (or brutal) in how that technology is applied or integrated into society. Therefore perhaps we should say that central, closed governments are not poor at science *per se*, but deficient in the more specific category of science-in-policy. After all, the Kuhnian model works as well (perhaps even better) in closed systems of government, where researchers pursuing 'normal science' can do so without distracting criticism.

The same may hold as true for policy as for science. Without outside interference, many political institutions fall into ways of thinking that remain unquestioned and are thought to apply equally well through time and space.

Conceptual variation is augmented when different scientific streams and a large group of actors covering a range of societal interests, look at complicated matters. If reality is plural and multidimensional, so should be our way of dealing with it. . . . Groups of actors in dominant positions are often incapable of realising new conceptual perspectives of great policy issues alone; they need the 'help' of rebellious actors to force them to think things over and adopt new ideas.(17)

17. Martin de Jong. 1999. "Institutionalised criticism: the demonopolisation of scientific advising." *Science and Public Policy*. 26, 3, p. 196.

Policy should thus be made more open to input from affected and interested people, and such concerns should be addressed by the state or responsible party *prior to* construction. This should allow greater quality for both scientific and political debates, provided that people do not defer to expert judgement without question.

The Open Society and Dangers of Administration

This last point is important, for as much as science relies upon an open society and the conflict of a pluralist system, so too does this system rely upon open science. This much has already been alluded to, that the Animas-La Plata project was shown for the poor plan it was precisely because of the open nature of the American system. Yet this connection was made as early as 1948 by Popper, who saw that democracy and closed science were incompatible, a thought echoed not many years later by Eisenhower. As Popper remarked,

An open society (that is, a society based on the idea of not merely tolerating dissenting opinions but respecting them) and a democracy (that is, a form of government devoted to the protection of an open society) cannot flourish if science becomes the exclusive possession of a closed set of specialists.(18)

Science may easily be transformed by the institutionalization of funding, the imposition of 'gag orders' upon scientists working in government or government-funded agencies, or simply the desire among scientists themselves to promote certain political

18. As quoted in: Mark A. Notturmo. 2000. *Science and the Open Society*. Budapest: Central European University Press, p. 7.

goals.(19) These values can all easily be found within research as it is practised. That does not mean, however, that nothing is to be done or that these conditions matter little for the average citizen. On the contrary, people have been perceptive enough to realize that not all is well when it comes to science in government, and this has been manifest in the growing mistrust of government policies regarding science. Visions of democratic accountability do mean something to people, and the process is important, albeit to differing degrees in different cultures.(20)

Such cultural influences can influence how science is handled in government, and relate back to some of the original questions which led to this research. Many of the concepts described within the context of bureaucratic process and false reasoning will be mitigated by the efforts of those who truly desire to uphold values of inquiry over outcome. At other times, any effort to undertake scientific research for purposes of questioning the goals of the organization will be severely constrained. In many ways, this is indicative of the debate between efficiency and democracy in government.

The general hope seems to be that increased public participation in administrative processes will help to curb the excesses of scientific mimicry and information manipulation, even though such measures may prolong the process. By presenting alternative values and interpretations, and by providing more of the oversight required by

19. Jeffrey A. Hutchings, et.al. 1997. "Is scientific inquiry compatible with government information control?" *Canadian Journal of Fisheries and Aquatic Sciences*. 54, pp. 1198-1210.

20. See Sheila Jasanoff. 1997. "American Exceptionalism and the Political Acknowledgment of Risk", in: *Comparative Science and Technology Policy*. Jasanoff (ed.), Cheltenham, UK: Elgar Reference, pp. 391-411.

the instrumental vision, the decision-making can be held to a more scientific and democratic basis. At the very least, codification of some broader institutional norms should be able to force a different rationality upon organizations. This is certainly the hope with regards to environmental impact assessment legislation.(21)

Others are less sanguine about the chances for public participation to make a difference, at least as long as administrative power remains much the same. It is quite likely that much of what passes for public participation is less than substantive, and only further legitimates a process which itself did not change as a result of public input.(22) In addition, as long as experts are involved in a process of defining environmental problems in technical terms which elude vocabularies of common understanding, public participation will be excluded to a degree.

While public participation provided some safeguards against extreme political bias or other forms of prejudice in scientific decision-making, it proved ineffectual against administrative manipulation of scientific data to suit predetermined policy objectives.(23)

To be fair, ineffective participation may not always be the case. The ability of the public

21. Robert V. Bartlett and Walter Baber. 1989. "Bureaucracy or Analysis: Implications of Impact Assessment for Public Administration", in : *Policy Through Impact Assessment*. Bartlett (ed.), Westport: Greenwood Press, pp. 143-153.

22. Lorna Stefanick. 1998. "Organization, administration and the environment: will a facelift suffice, or does the patient need radical surgery?" *Canadian Public Administration*. 41, 1, pp. 99-119.

23. Sheila Jasanoff. 1986. *Risk Management and Political Culture*. New York: Russell Sage Foundation, p. 71.

to scrutinize administrative decisions, or to have such decisions examined in court, does provide inroads to contesting fraudulent data. Even if the state has control of political expression, the ability to use science against government claims can still prove useful when in direct contradiction to the state's 'facts'. Even if such facts are ultimately based upon relative perceptions of the situation, such conflict is useful in highlighting the inability of government to control all aspects of environmental reality.

Governments, by choosing to exclude public input by framing environmental issues in technical, expert-driven terms, place themselves in a vulnerable position. For as long as the problem is defined according to science, then science can be used by state critics and turned against the political goals being sought. Information suppression can never be complete, and a state which relies upon science for its own legitimation cannot easily risk denigrating such inquiry without harming itself. For these reasons, administrative politics in practice contains mixed elements of both supporting and suppressing science, of valuing (or simply allowing) open debate and attempting to prevent it. The specific patterns of such behaviour depend upon the institutional norms of the country and region in question, and how well the administrative state manages to maintain its legitimacy according to the instrumental vision.

Conclusions

The conclusion to be drawn from this research is that, left to itself, public administration will not be able to adequately handle scientific research, and that this

condition poses a threat to democratic systems. The authority of administration to act independently of direct accountability has rested on the belief that it can transform scientific knowledge into policy for the common good. It appears, however, that science cannot be so easily transformed into policy absent political judgement, and that even more worrying, the preconditions for science often do not exist. Environmental policy has looked to science for guidance, and yet people have been frustrated and worried at the ability of both sides in disputes to employ its data. As we have seen in the various case studies, these debates often attempt to avoid the politics involved, they are constructed in such as a way as to absolve the state of its responsibility for action or non-action, and they create a false and fragile sense of legitimacy.

Environmental policy was the focus of this research for several important reasons. Not only does such policy rely heavily upon scientific research and have a history of such a close relationship, environmental politics also force new ways of thinking that have made this relationship anything but harmonious. By redefining or questioning our relationship with nature, it is possible to see that issues are quite broad, that complex interrelationships make simple, technical solutions dangerous. At the very least, construction of problems into technical language makes us blind to the possible consequences of our actions. Science is not a panacea to these problems, but it is not irretrievably lost, either.

Proper scientific research is necessary for sound, democratic policies, but it must be understood that both such science and such policies require conflict and acrimony. All sides of environmental debates must be open to alternative explanations and policies, and

they must be willing to compromise at times. But these conditions will not be possible unless care is taken to ensure that administrative institutions of government remain open to those they purport to serve, that the science be made available *to* debate. Without this openness and interference, the conditions for scientific research and inquiry will be lost to political ambition and power.

These conclusions resonate well with the arguments of those advocating a more 'open society' and even earlier proponents of pragmatism. Yet too often the relevant questions have been asked independently of one another. Many writers have asked how well environmental policy can be conducted if it is posed merely as a technical problem, rather than as part of a broader and more inclusive debate. Others, such as Popper, have asked how well science can be conducted in a closed society. These are similar questions, but it has been difficult to bring them together because of conceptual problems related to definitions of science and rationality. Yet it is crucial that they are recognized as interdependent, for environmental policy cannot be freed from technicism without more open society, nor can science be handled properly as long as policies are defined in purely technical terms.

This research therefore goes beyond the previous literature in linking these important questions. Writers like Popper, Orwell and Notturmo may have long been aware of the dangers of allowing science to be controlled by government, but what was lacking were specific explanations of how and why this occurs in public administration. It has been too easy to fall into the trap of considering science to be either a successful search for the truth (the logical positivist tradition) or an unsuccessful search for the truth (the

constructivist vision), both of which miss the important point of why bureaucracy can damage science. For as long as science is merely a methodology predicated on conditional knowledge, the necessity of doubt is the vital component. What this research accomplished is to explain more fully the processes of goal displacement, conflicting rationalities and organizational communication that so heavily damage doubt and attempt to force certainty. In so doing, this research has not repudiated the earlier work of those in philosophy of science, development studies and public administration. Rather, it is hoped that this thesis has provided a way of expanding analysis of policies and methodologies that have been so heavily criticized in the past.

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Figure 1: Map of the Bős-Nagymaros Project

Source: <http://www.geographynetwork.com/>

Figure 2: Map showing location of Alta, Norway

Source: <http://www.geographynetwork.com/>

Figure 3: Map of the Alta River Dam and Surrounding Area

Source: <http://altalaks.inord.no/>

Figure 4: Map of the Original Animas-La Plata Project Area

Source: <http://www.coloradocollege.edu/Dept/EC/Faculty/Smith/Projects/ALP/>