

ASSIGNMENT COVER SHEET

Student ID	U <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="4"/> <input type="text" value="8"/> <input type="text" value="9"/> <input type="text" value="6"/>
Name	<input type="text" value="Piseth Keo"/>
Course code	<input type="text" value="EMDV8103"/>
Submitted to	<input type="text" value="Dr. JOHN McCarthy"/>
Assignment title	<input type="text" value="The Role of Science in Environmental Assessment"/>
Word count	<input type="text" value="2196 words"/>

CHECKLIST

I have:

- followed the referencing rules set out in the Crawford Style Guide
- followed the formatting rules set out in the Crawford Style Guide
- submitted the final version of this assignment to Turnitin

Declaration

I acknowledge that I have read, and understand, the summary of the ANU Code of Practice for Student Academic Honesty which is available at:

http://academichonesty.anu.edu.au/anu_policy_for_academic_honesty.html#codesummary

I acknowledge that:

- this assignment is my own work
- this assignment is expressed predominantly in my own words
- the words and ideas of others, where used, are properly used and acknowledged
- no part of this assignment has been previously submitted for assessment.

I understand that by submitting my work to Turnitin, my work will be retained in an electronic database by Turnitin, for the purpose of future checks. This database cannot be accessed by non-Crawford School Turnitin users without permission.

Signature

Date

Essay Question

Environmental assessment aims to integrate environmental considerations into governmental decision making by deploying science to carry out systematic prediction and analysis of environmental consequences of a proposal before activities begin. To what degree do you think the application of scientific knowledge about environmental consequences has led to better decisions? Why? How might the role of science be enhanced? Make sure you refer to examples in your discussion.

Introduction

Science has long been recognized as a powerful tool for discovering truths about the world; at the very least, science is able to make reasonably accurate predictions about the world. The use of science as a decision-making instrument penetrated the discipline of environmental management and development mostly after the US Natural Environment Protection Act (NEPA) was adopted in the 1960s. Under this act, major development projects that may potentially have detrimental effects on the environment are mandated to undergo environmental impact assessment. In this regard, project proponents are required to produce several environmental impact statements, in order to provide the evaluating authority truthful and verifiable information on the possible consequences of the project before a final decision is made. However, a number of studies have shown that science can aid decision-making only to a certain extent, and that often, it fails to indisputably achieve its primary goal of improving the decision-making process and/or its outcome (Cashmore, 1994). For instance, in the case of the Yali hydropower dam development in Vietnam, scientific evidence did not help solve the problem of transboundary environmental impacts because of the complex political environment within which the decision-making process is situated (Wyatt & Baird, 2007).

This paper gives a brief overview of various definitions of science. It also focuses on the extent to which science can play a role in decision-making for the environment. Finally, the paper provides suggestions on how the power of science in environmental decision-making can be enhanced.

Definition of science

Multiple definitions of science can be found in academic literature. For example, Keller and Botkin (2008) define science as a process of discovering and looking at the world. The authors describe science as a continuing adventure to acquire better knowledge about how the world works, and state that science has to do with things that can be tested or observed. Wright (2008), on the other hand, refers to science as knowledge gained by the employment of the scientific method, which includes the processes of observation, hypotheses formulation, testing and/or experimentation and theorization. Beattie (1995) agrees with Wright's (2008) definition of science as a structure of study, and adds that it aims to investigate and clarify different aspects of the phenomenon being studied. Based on these definitions, it is clear that 'science' is generally regarded as characterized by the scientific method, and that it attempts to prove and/or disprove phenomena. It, therefore, does not involve value judgment, as values are subjective and impossible to verify.

The success of the application of science in environmental assessment

The original purpose of the integration of science in environmental assessment is to improve the decision-making process and/or its outcomes. In this regard, it can be said that this goal has been achieved to some extent. As indicated above, science is often employed to arrive at the 'truth'. With knowledge of what is 'true', policymakers can decide what policy forms and/or instruments are most suitable for the achievement of their desired objectives. Collingridge and Reeve (1986), for example, consider science as a reliable, evidence-based reference, which is useful for explaining various occurrences and making these occurrences predictable, thereby providing a basis for appropriate interventions to be planned accordingly. They further argue that thorough scientific research would allow science to play this role. There are a number of cases, in fact, where scientific evidence was used to justify stringent environmental regulation on investment projects that cause environment damage. For instance, in a case between the state of California and Methanex Corporation (a Canadian distributor of methanol in 2005), the state decided to ban the sale of Methanex products, because there was scientific proof that these not only have harmful effects on public health, but also become water pollutants (Aisbett, 2006).

In this regard, science is increasingly becoming a standard guiding tool for the development of global environmental policy. Using science as a foundation, international organizations such as the World Bank and the Asian Development Bank are working together to establish global criteria for ‘sound’ environmental impact assessment, in the interest of the preservation of human wellbeing. In this sense, individual development projects would be required to follow the agreed upon procedures, especially if it is applied for funding. Furthermore, there are many global environmental negotiation processes that use (and have used) science as a point of reference to arrive at international agreement. For example, scientific information on climate change raised the alarm for a number of concerned countries to ratify the UN Framework on Climate Change Convention in 1992, by committing themselves on a set of reduction targets for carbon emission (United Nations, 1998).

Limitations of science in environmental assessment

While science can readily be seen to play a major role now in policymaking, it must be noted that in many cases, its power is not effectively applied in environmental assessment (EA). The underlying issues that contribute to this are as follows:

First, some literatures argue that EA is not science. For example, both Keller and Botkin (2008) and Wright (2008) state that EA is a part of environmental science, which does not only fall under a pure science, but also takes into consideration human values in its study. Similarly, Cashmore (2004) analyzes the roles of science in EA process by classifying it into two main categories: applied science and civic science. Applied science is taken to mean as the process of applying the scientific method for practical functions, while civic science refers to an inclusion of the social and the political dimensions involved in the process. The work of these authors were used as a basis for criticism in Beattie (1995), which claims that ‘science’ in EA does not test the truth of and/or refine explanation for phenomena. According to Beattie (1995), EA is conducted to predict the possible impacts of a project, which may or may not be comparable with the actual impacts of the projects. Since EA is inseparable from value judgement, the process cannot be considered a science.

Value judgement in EA gives rise to more complexity in the process. First, the science in EA is not autonomous. EA experts do not determine the method of study. In practice, EA professionals propose the scope and processes of conducting the environmental

assessment to the proponents and often, the project proponents would choose the set of methods that would incur the lowest costs for them. In this sense, EA professionals are able to apply science only to study the impacts, which meet the minimum requirements of the consent authority, rather than the whole range of possibly significant impacts of the project overall. The application of science in this manner may cause more detrimental effects, where environmental knowledge of the consent authority is limited. However, this kind of practice is gaining momentum because EA work is fast becoming a competitive business for EA firms (Collingridge and Reeve 1986); there is an economic incentive for EA firms to package proposals conservatively, in order to win the bid to the potential client. This was observed in the Yali Dam development in Vietnam, where the Vietnamese government insisted on contracting the SWECO and Statkraft Groner firms to conduct their EIA, despite the fact that previous research conducted by these firms were deemed inadequate by the ADB (Wyatt and Baird, 2008). Therefore, the scope within which science can be utilized effectively is limited and determined by those who hold decision-making power.

In addition to the relationship between the project proponents and the EA firm, there is another complicated relationship between the government and/or the consent authority and the proponent. The proponent may apply personal persuasion to convince these governing authorities to lower the conditions set for EA studies. This informal communication can allow decision-makers to determine policies based on scanty information and undermine the mechanisms applied by scientists to prove the truth (Collingridge and Reeve, 1986). For instance, if decision makers perceive that the immediate benefits of a project are high, they may decide to approve the project by ignoring its possible impacts in the future. This can be seen in the case of a decision made by Malcolm Turnbull, Minister of Environment and Water Resources, on pulp mill development in Tasmania. He considered the benefits of the project as greater than the costs, so he gave approval for project implementation by ignoring the possible concerns raised by the relevant consent authorities, the local community and larger civil society (Commonwealth of Australia, 2007).

Other key challenges for the success of science in EA are time constraints and expenses. For the sake of development projects, the faster it can be operated, the more benefits can be maintained and maximized. In this regard, it is common that policymakers prescribe a time limit for scientists to conduct the study and provide the necessary information. Beattie (1995) observes that EA are usually required to follow a strict deadline, which

results in data gaps and simplified assumptions. Collingridge and Reeve (1986) also conclude that this becomes a major challenge for scientists with regard to collecting as much information as they can. This was also the case in the Yali Dam development: because of time constraints and the high costs involved in the project, the Vietnamese government decided to select a small scope of the studies, and the results of the study was greatly incomparable with the actual impacts of the project after its implementation. The extent of actual impact was much higher than predicted (Wyatt and Baird, 2007).

However, in some cases, the scientific method does take too long and yet the uncertainty still exists. This creates a difficult situation for decision makers to settle on the project. For example, in the Three Gorges Dam project in China, the environmental impact assessment was conducted for almost ten years before the project was implemented (Tullos, 2008). After its implementation, the significant impacts, which were predicted by the studies, did occur. Therefore, the determination of time should be carefully done before the study is started.

Suggestions

To improve the role of science in EA, it is initially important that the methods applied by science be given autonomy – not to be influenced by politics, disciplinarity, and a low level of criticism towards conjectures (Collingridge and Reeve, 1986). Also, the scientific community needs to further refine the scientific method in order to reduce biases and improve accuracy, especially of data collection and interpretation. Beattie (1995) suggests that if EA practitioners work their best to produce a quality research, the decision makers will have a hard look at the information before the decision is made; and if the decision is made without scientific basis, there are higher chances of public criticism. However, Beattie (1995) also mentions that this suggestion may become a challenge when time and budget come into the question and EA practitioners know this. However, they should still be optimistic about what science has achieved so far in EA and try to work to improve it.

Since EA is the integration of both science and social and political processes, it is also important to allow more people to be involved in the process. Wallington (2004) describes this process as deliberative democracy – meaning, in particular, that public participation must be encouraged to help fill the gaps in scientific knowledge. Nowotny's words (1982) cited in Collingridge and Reeve (1986) concludes that

‘science as a form of cultural domination, with technology as its material incarnation, has yet to come to terms with demands for democratization, which sounds utterly alien to any elite, including the scientific’. As Wright (2008) noted, environmental science cannot be studied without consideration of the social context within which it operates. Public participation has been noted to be useful in aiding in the generation of information, especially when they have been closely interacting with or witnessing the phenomena being studied.

One key importance of public participation is bringing the social values and preferences for the analysis in EA (Petts, 1999). Most often, local people have native knowledge that the professionals do not have, especially on the social and cultural values of the area and environment surrounding their daily life. Additionally, there will be an improvement in the transparency of the process, which would ensure that the benefits and costs of the project will be spread for the whole of society, and not only particular individuals. At present, there are various efforts by international agencies to include international standards of social impact assessment in EA, which aims at identifying the actual impacts of the projects and to ensure the precise assessment of the project. These practices have significantly increased to various major development projects in the world.

Conclusions

In sum, science is a powerful tool that can be used in environmental decision-making. It reduces uncertainties in the process by providing a reliable and verifiable reference for data and information. However, the extent to which science is used effectively in EA is limited by the social and political processes that surround or are part of the EA process itself. To this end, the process of EA can be improved by encouraging public participation and deliberative democracy, so that decision makers will be pressured to take a hard look at the scientific evidence provided before approving any development.

References:

Aisbett, E, Karp, L, & McAusland, C 2006, 'Regulatory takings and environmental regulation in NAFTA's Chapter 11'.

Beattie, RB 1995, 'Everything you already know about EIA (But don't often about), Environmental Impact Assessment', pp. 109-114.

Cashmore, M 2004, 'The role of science in environmental impact assessment: process and procedure versus purpose in the development of theory', *Environmental Impact Assessment*, vol. 24, no. 4, pp. 403-426.

Collingridge, D & Reeve, C 1986, *Science speaks to power: the role of experts in policy making*, Frances Pinter (Publishers), London.

Commonwealth of Australia, 2007, 'Environment protection and biodiversity conservation act, 1999: decision to approve the taking of an action', Canberra, Australia.

Keller, EA & Botkin, DB 2008, *Essential environmental science*, John Wiley and Sons Inc., New Jersey.

Petts, J 1999, Public participation and environmental impact assessment in J Petts, (ed.) 1999, *Handbook of Environmental Impact Assessment: Process, Methods, and Potential*, vol. 1, Blackwell, Oxford, pp. 145 – 177.

United Nations 1998, 'Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC)'. Text available at http://unfccc.int/kyoto_protocol/items/2830.php.

Wallington, T 2004, Understanding the practice of environmental assessment, Chapter 1, in *Civic Environmental Pragmatism: A Dialogical Framework for Strategic Environment Assessment, PhD Thesis*.

Wright, RT 2008, *Environmental science: towards a sustainable future*, 10th edn, Pearson Education, Inc., New Jersey.

Wyatt, AB & Baird, IG 2007, "Transboundary impact assessment in the Sesan River Basin: the case of the Yali Falls Dam", *Water Resources Development*, vol. 23, no. 3, pp. 427-442.