Trees, Science, and Public Processes: A Western Australian Experience

Martin Breckner

Introduction
Perceptions of science and of its role in political processes have changed significantly over the last 50 years, and today’s science-society relations can best be described as paradoxical. Presently, there is an unprecedented societal dependence on expertise with science featuring strongly in the political arena and public life in general. At the same time, however, a growing resentment towards expert-driven processes (Yankelovich, 1991), a sense of marginalisation of the general public by the dictatorship of scientific and political elites (Waller, 1995), and a mounting rejection of scientific determinism are becoming discernible.

These changes in public perceptions of science are also mirrored within the sciences themselves. Science no longer speaks with one voice (it never really did), and public disputes with all sides in the debate supposedly argue best science are quite common. In other words, science’s claim to truth, once perceived to be absolute, have become far more relativistic, and the notion of truth’s autonomy (after Aronowitz, 1988) has come under attack and thus science has as well. While we are told that these tensions are a hallmark of post-modernity (Matthews, Young, & Elliott, 2002) and are perceived as both cause and effect of risk societies in general, (Beck, 1986; Giddens, 1990), questions must be asked whether and how science can be expected to play a credible role in policy-making processes in light of dwindling public faith in the customarily accepted authority of science.

This paper examines, as part of a wider investigation (see Breckner, 2002b), the role of science in a national government process, coined Regional Forest Agreement (RFA), which was designed to put to rest a long-standing dispute over native forest use and management in Australia. Using the Western Australian experience of this government process, RFA stakeholders' perceptions of science are investigated employing discourse analysis. Stakeholder responses are assessed to identify the way and extent to which science had been engaged in the RFA, gauge the perceived adequacy of the use of science in the process, and measure the degree to which science enabled capacity building as a process outcome. In an attempt to answer the question as to what can be learned from this process, the study results point towards contradictions between scientific and political processes and existing tensions that potentially jeopardise the public credibility of both environmental policy-making and science itself. It is suggested that credible environmental policy-making depends on credible science. To this end, calls are made for the revisiting of science-politics relations, especially with respect to the rules of scientific engagement in processes of policy formulation, the treatment of plural perspectives, and the issue of transparency as it relates to ideology and assumption-making.

Some Comments on Science and Public Processes
Much debate has been, and is being, had on science, its methods, its sociological and philosophical underpinnings. Most of these somewhat esoteric debates about what science is, or is not, chiefly involve experts rather than laypeople and therefore give the impression of being somewhat removed from the public. Paradoxically, public perceptions are what shape and define the dominant conceptions of science (Revez, 1971), although the public is seen to largely misunderstand science (Wynne, 1991). It might be inmaterial, therefore, whether experts consider science and its methods to be best characterised by conventionalism (e.g. Duhem, 1962), inductivism (e.g. Reichenbach, 1938), deductivism (e.g. Popper, 1968), golem (see Collins & Pinch, 1993) or indeed Dada (see Feynman, 1975) since science’s public image and perceived essence is seemingly defined outside the expert realm.

On the question of how the public perceives science the literature speaks of a so-called standard view of science (see for instance Scheffler, 1967). This standard view, also coined inductivism, although not in the Baconian sense (Riggs, 1992), sees science in a very positive light, portraying science and its methods as the one best way of discovering and learning about the laws of nature. Thus, science and scientists are positioned in the centre of public life as society’s principal problem-solving authority (Coggrove, 1982;
Milsenth, 1989). In light of the widespread admiration for, and acceptance of, the wonders of science (Ravetz, 1971), there is a seeming incongruence between what scientists and the public perceive as objectivity. Inductivism seems to confuse, or indeed replace, what scientists would regard as the ideal of objectivity in science (Scheffler, 1967) with the myth of objective science. Certainly, science attempts to "transcend the social and economic background, to overcome the weight of prejudice, of custom and example, and to formulate statements that in some way or another capture how the world is" (Jarvie, 2001, p.560). And science is considered credible and is respected because of its methodical nature, rigorous protocols, in-built checks and balances such as peer review and all the hallmarks of scientific research. Objectivity, however, is a philosophical maxim, which the scientific protocol aims to maintain but cannot guarantee. Still, the perception of objective or quasi-infallible science seems to exist and is apparently underpinned by science itself. Snow (1964) argues that the shallow optimism ostensibly exuded by (in particular hard) science is fuelling and perpetuating this myth of objectivity. Hard sciences with their highly codified and often quantitative work (and their technology), as argued by Deetz (1996), are often privileged to receive the objective label and are therefore favoured in public and political life. Soft sciences, or interpretivists in general (after Morgan, 1986), are given the subjective label for the more qualitative nature of their work, which deals with interpretations of an interpreted world, and are therefore considered less credible and reliable in the eyes of the public (Deetz, 1996). In fact, it seems as if openly stated assumptions and values raise greater suspicion when hidden behind methodology and numbers. Nevertheless, this perception of objectivity arguably provides relative certainty, which represents one of humanity's holy grails. Science's quasi-monopoly on certainty has given rise to scientific determinism, and this, in turn, has allowed science to attain a prominent social status and itself to become a symbol of progress and human welfare (Paehlke, 1989). So, within inductivism, science is not only seen as humanity's provider and guardian of knowledge and truths but also the driving force behind social and economic advancement.

It is therefore not surprising perhaps, that the twentieth century has witnessed an ever growing reliance on science by a society, which has been willing to invest considerable public trust in the expert system (see Giddens, 1990). In part, this trend can be seen as the result of the growing complexity of modern, technology-driven life and the perceived inability of laypeople to make informed decisions in light of such complexity (Ophuls & Boyan, 1992); thus, the concomitant need for scientific competency in decision-making processes on policy, governance, and control (see Postman, 1992). However, the hegemonic social status and position of power held by science and scientists, however, has also created tensions, leading to a dissipation of public trust in traditional institutions, including scientific institutions.

Certainly since the Manhattan Project in the early 1940s a public awareness grew of the less than benign (political and commercial) applications of science and technology, their consequences, and associated risks. Such awareness was heightened by published scientific work on the environmental depredation caused by industrial life (e.g. Carson, 1962) and the postulation of limits to unconstrained population, and economic, expansion throughout the doomsday decade of the 1970s (e.g. Ehrlich, 1970; Meadows, Meadows, Randers, & Behrens, 1972; Meszarovics & Pestel, 1974). Publications such as these were seen to provide the scientific backbone for modern environmentalism, blurring the boundaries between science and environmental/social advocacy and deepening the aforementioned trenches between so-called soft and hard sciences; the latter being more closely linked to the political and economic status quo. In the ensuing years well publicised environmental disasters such as Love Canal, Three Mile Island, Chernobyl, climate change - or more locally, salinity in many parts of Australia - gave an increasingly alarmed public a sense of science, or certain spheres within science, "[being] at the heart of many environmental disruptions" (Paehlke, 1989, p.116).

Predictably, this tainted image of science triggered a growing distrust towards science manifested in public resentment towards expert control and power over fateful political and social decisions (Yankelovich, 1991; Jasenoff, 1996). Knowledge constitutes power (see Foucault, 1982), and scientific knowledge can therefore be considered a political tool as experts' cognitive powers can be used to influence public affairs. While power and control may be exercised, it is not necessarily done by those who generate the knowledge that underpins it. While science has become the weapon of choice in what Waller (1995) calls scientific-sam-political struggles in today's political arena, it is rarely the scientists themselves however, who become involved in those disputes. Scientists are said

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1 The existence of professional/institutional allegiances means, however, that scientists can and do become (politically) involved. This relates to the issue of ideological denial, which is addressed at a later point.
to have “a modesty about expressing opinion”, and this may only occur once “ideas have been tested in the realm of their peers through publication in peer-reviewed literature” (Gascoigne & Metcalfe, 1998, p.6). In fact, it could be argued that scientists’ commitment to accuracy and proper scientific procedures precludes, due to perceived methodological handoffs, their active engagement in public discourse (see Hobbs, 1998; Recher, 1998). Consequently, scientists operating from within this passive-defensive position are inadvertently prone to be used to legitimate political processes, hence enabling the politicisation of science. It needs to be acknowledged however, that scientists also operate under professional/institutional constraints, as will be illustrated by the case study in hand, shaping allegiances that can prompt scientists to become (politically) involved in policy processes. This involvement can either be active or passive and therefore relates to the issue of ideology and ideological denial, which is addressed at a later point.

In tuto, scientific input is required into public/political processes (Yankelovich, 1991; Waller, 1995; Lubchenko, 1998). Yet, there are numerous unanswered questions relating to the extent to, and the capacity in, which science and scientists should be involved in these processes. Also, a fundamental question relates to the problem-solving capabilities of science where reductionism meets holism (soft/hard science divide), meaning situations where intertwined and often conflicting ecological, ethical, social, and economic aspects need to be considered. This also incorporates the issue of scholarship and advocacy and the problematic of professional/personal allegiance. Where does science need to draw the line? It is against this background that the role of science in the Western Australian Regional Forest Agreement will be analysed in the following, and it is these issues that will be returned to in the ensuing discussion.

The Western Australian Regional Forest Agreement: A Brief History and Methodological Notes

In Australia, there has been a long-standing dispute over native forest use and management. The intensification of industrial forest exploitation in the 1960s coincided with the emergence of new cultural and social values, which resulted in a change in public sentiment concerning the nation’s forests. Over the years, the conflict escalated, and by the early 1990s the forest debate represented the country’s single most controversial environmental issue with strongly contested ecological, economic, and socio-political dimensions (for a history of the forest debate refer to Carron, 1985; Australian Conservation Foundation [ACF], 1987; Dargavel, 1995; Meter, 1995).

In an attempt to end the conflict between conservationists and the country’s timber industries, also in response to the growing electoral significance of the forest issue, the Federal Government committed all States and Territories to the signing of a National Forest Policy Statement (NFPS) in 1992. Three aspects formed the core of this policy framework, these being resource security for an internationally competitive forest products industry, comprehensive, adequate, and representative (CAR) forest reserve systems, and ecologically sustainable forest management (ESFM) (Commonwealth of Australia, 2002). The NFPS offered a mechanism whereby the Commonwealth and the State governments could reach agreement on the long-term management and use of forests in a particular region. This mechanism was the RFA process, which was portrayed as a comprehensive national blueprint for balance, certainty, and sustainability in the management of Australia’s forests.

RFAs were based on comprehensive regional assessments (CRAs) of environmental, heritage, economic, and social values within delineated RFA areas. These scientific studies were to form the basis for the generation of forest use and management options subsequently to be agreed on by the Commonwealth and the respective States. Environmental values, in particular, needed to be assessed consistent with a set of nationally agreed, albeit scientifically contentious, criteria (also known as JANIS criteria after Joint ANZECC/MCPFA National Forest Policy Statement Implementation Sub-Committee) for the development of CAR reserve systems. The JANIS criteria were a critical part of the RFAs for they defined the national standard for forest reserves in relation to biodiversity, oldgrowth, and wilderness protection; these represented the issues that were at the heart of the enduring forest dispute.

Australian RFAs were portrayed as “agreements backed by science, science and more science” (Commonwealth of Australia, 2000, p. 9). RFAs were purported to have been based on the most detailed and comprehensive scientific assessments ever made in Australia (Commonwealth of Australia and Government of Western Australia, 1997). Indeed, a total of AU$115 million was spent on CRAs nationally (Commonwealth of Australia, 2000). Moreover, science was said to have formed the basis for sound decision making on commercial forest use and conservation (Ell, Anderson, & Edwards, 1997; Forests Taskforce, 1998), and in that regard Western Austra-
lia was no exception. The Western Australian RFA was also promoted as being scientifically based, and the public was assured that scientific input to the RFA was sought by the State and Commonwealth governments via workshops, expert panels, and the commissioning of CRA research projects. More than 500 scientists and experts were said to have been involved in the process (see WA Parliamentary Debates - Hansard, 1999b) producing 38 CRA reports over a period of three years and providing advice to the process' Steering Committee (WA Parliamentary Debates - Hansard, 1999b). Nonetheless, the science of the Western Australian RFA was contested as numerous questions arose during the process regarding its credibility in light of alleged data manipulation, intellectual suppression, and bureaucratic censorship.

In the end, partially because of credibility problems, the Western Australian RFA triggered an enormous public backlash with petitions, mass protests, and rallies when it was finalised in May 1999. Although the RFA was described many times as an extensive scientific process which could not be overturned overnight (WA Parliamentary Debates - Hansard, June 1999, p. 9390/3) it was amended in response to public pressure only eight weeks after it had originally been signed. The changes to the original RFA were without discernible reference to the science of the RFA process, which ostensibly damaged the credibility of science and the process it was said to have undetected. Science, the purported strength of the RFA was seen by many RFA stakeholders to have become its fundamental weaknesses.

This paper addresses the credibility issues surrounding the science in the Western Australian RFA, its role in the process, and the impact it had on the final outcome as perceived by RFA stakeholders. The analysis of stakeholder perceptions, as presented here, is based on interview data collected as part of a broader, case-study-based, investigation into the Western Australian RFA (see Broeckner, 2002b). For the purposes of this research around 60 interviews were conducted with RFA stakeholders and transcribed over a three year period from 1999 to 2002. Research participants were chosen based on snowball sampling2, which enabled the involvement of a wide range of RFA stakeholders including politicians, process managers, bureaucrats, conservationists, timber workers, forest industry representatives, scientists, members of the general public, and others. The idea was to utilise the interview data - cross-referenced with RFA-related literature and media content - to identify stakeholder views, desires, and mindsets within stakeholder discourses (here in relation to the science of the RFA). Discourse analysis was employed as the method of choice for the treatment of the research data, and this approach is briefly described below.

Discourse analysis has a widespread application to various corners of the human and social sciences, and many definitions of, and applications for, discourse analysis exist. This study has adopted a constructionist variation of this approach following other work done in the area of public policy development (see for instance Fischer & Forrester, 1993; Dryzek, 1997; Meppen, 2000). Within social constructionism discourse is seen as a product of a shared version of reality (subjectivity) between interlocutors. Discourse itself is defined as a "shared way of apprehending the world" (Dryzek, 1997, p. 8), and language is viewed as "a reality-creating social practice" (Fowler, 1985, p. 62), being reflexive or reciprocal (Dumati & Goodavin, 1992; Guenzer & Levinson, 1996), simultaneously reflecting and construing reality (Gee, 1999). Indeed, reality is seen as a social construct and consequently "no single correct reading of the external world [is said to exist] within discourse analysis" (Manning, 1979, p. 660). Moreover, as affirmed by Bartlett (2002), truth and reality are not only socially constructed or created but also contextual (Agar, 1994; Clark, 1996), a product of language (see Fowler, 1985), as well as political (see Saussure, 1974; Lacan, 1975; Foucault, 1978; Dryzek, 1997). This essentially means that what is perceived to be true or real can vary just as meaning and content of discourse can change in response to contextual changes (e.g. temporal, cultural, geographical) and that discourse itself can be determined by motives to specific ends (i.e. discourses for course).

The aim of this study was to gain insights into people's perspectives and aid the understanding of multiple paradigms at work. In the light of that aim discourse analysis was deemed an appropriate tool for it lends itself to critical reflection (Lanks, 1998), the detection of norms and ideologies (Manning, 1979), the exposure and analysis of power relations (Putnam, Phillips, & Chapman, 1996; Foucault, 1978), the improvement of communication (Lanks, 1998) and organisational effectiveness (Morgan, 1986), the sense-making of unfamiliar environments (Orrory, 1993), and the formulation of new ideas and concepts reflective of newly gained knowledge and values (Bartlett, 2002).

Based on a grounded theory approach (for details see Strauss & Corbin, 1990; Glaser, 1998), the discourse analysis method employed here proceeded with the

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2 This approach is discussed in more detail by Goodman (1961) and Babias (1992).
coding of the transcribed interview data through an iterative process. This involved the selection of phrases and entire sentences from the interview data; however, fragments such as adjectives, adverbs, past participles and other temporal verb conjugations, and nouns were also considered. The motivation was to analyze interview data rather on the sentence level than, for instance, the metaphor level driven by the desire to leave as much of research participants’ statements intact as possible. This in turn (a) enabled minimal author intervention (b) reduced the risk of selectiveness, and (c) enabled participants to tell their story. An exclusive focus on metaphors, in contrast, would have meant the loss of much valuable context and harboured the risk of simply putting forward the author’s story.

Following the data selection, through a process of iteration, chosen information fragments were then without superimposed structures and hierarchies, which constituted an attempt to eliminate/minimise author pre-eminence. While the chosen thematic groups can be seen as arbitrary, they signified in a sense experimental hypotheses, and at the end, the discourse data itself was to either validate or invalidate earlier assumptions about existing categories. Data partitioning also provided the basis for further questioning and analysis and allowed for a parenthetical presentation of the interview data, which was then complimented with, and compared to, data derived from relevant RFA-related literature and media content. Word maps were primarily used as a structural tool, and due to space limitations they are not included in the analysis provided below.

The data mapping also involved a form of in-text coding, yet without specific reference to the information source because the protection of participant’s

<table>
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<th>[we] produced a draft on criteria for forest conservation, and then that draft was basically shunted</th>
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<tr>
<td>The 15 per cent, as I understand, was huge because the IUCN criteria at the time were 10 per cent</td>
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<td>We were fundamentally unhappy with putting quantitative restrictions on forest management</td>
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<tr>
<td>not all scientists may have been agreeing that these criteria were correct because … that’s a political statement about whether you protect five per cent, ten per cent, or 20 per cent of forests</td>
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<td>we fundamentally opposed the whole concept and the set of criteria that were being adopted</td>
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<td>These figures are totally arbitrary</td>
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<td>[The JANIS figures] were very good within the limitations of the … you know, recognizing that you are using surrogates</td>
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<td>… it is unfair dragging us down to a lowest common denominator</td>
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<tr>
<td>the ministerial representatives … put in a lot of “may” or “if it’s appropriate” etc., etc. in to it so that it did not have any real force like the original document and the process went ahead</td>
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<tr>
<td>It may have been that some scientists did not agree with those JANIS criteria</td>
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<tr>
<td>There is no scientific justification, and it was clear right from the outset that science and scientists were used to validate a political process</td>
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<td>The scientists were instructed to come up with the volumes … which said that 10 per cent of all existing forested land of all the various ecosystem types should be put into the reserve system … that was changed to 15 per cent … that was, I think, a huge political mistake</td>
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Word Map 1: Stakeholder Perceptions of JANIS Criteria

partitioned into word maps, also called rhetorical landscapes (Butteniss, Wolfenden, & Goodridge, 2001) or environments (Myerson & Rydin, 1996), by way of identifying emerging themes and creating more manageable data categories in the course of the analysis. Word maps were produced using interview data that related to specific interview questions, which effectively helped define data categories such as stakeholder perceptions of the NFPIS, the JANIS criteria, the RFA process, its outcomes or certain aspects of. As shown in the example in Word Map 1, selected interview data were then randomly placed inside the corresponding word maps. A random order was chosen to allow the scanning of stakeholder information without superimposed structures and anonymity was a research condition. For this purpose research participants were grouped through a process of self-identification. This meant that research participants were essentially categorising themselves by way of stating their memberships, affiliations, and/or the capacities in which they were being interviewed or responding to certain interview questions. Out of all interviewee responses that were collected a total of five broad stakeholder categories emerged, which are listed in Table 1. The use of colour-coding meant that direct quotes taken from the interview transcripts appeared in the colours corresponding with participants’ affiliations (e.g. statements by members of the scientific community
are shown in blue etc.

- Timber Industry/Industry Groups/Unions
- Government/Departments/Political Parties
- Stakeholder Reference Group/General Public
- Environment Groups
- Scientific Community

Table 1: RFA Stakeholder Key

One methodological reminder needs to be issued here in light of the postmodern character of this paper. It was not the intention of this analysis to deliver outcomes readers would readily agree with or to arrive at authoritative statements about how things really were. In other words, the question was not whether what was found is true or not but rather what could be learned from it. This is also how the discourse analysis method could be characterized in general in that the usefulness of this approach does not lie in the absoluteness of the findings that it may produce but in the learning that may occur during the analysis. This point is emphasised by Butteriss (2002) stating “the question that should be asked of any discourse analysis is not how truthful it is, since each reading will be different according to its own theoretical premises”. Instead, as argued by Burr (1995), the usefulness of this analysis is to be gauged by the contribution it can make to sense-making and problem solving. The intention here was to unearth stakeholder perceptions of the role science played in a contentious political process in an attempt to use the insights gained in connection with related research to contribute to the debate on science, society, and environmental policy-making.

Stakeholder Perceptions of the Science of the Western Australian RFA

An analysis of the science of the Western Australian RFA needs to start with the establishment of the JANIS criteria, which provided the scientific benchmark for forest reservation around the country, as was mandated by the NFPS. As pointed out by Kirkpatrick (1998), scientifically credible criteria were not only needed to operationalise the terms of the NFPS but also to overcome the distrust of conservationists towards government-driven processes in relation to forestry. In other words, much was dependent on the acceptability of these criteria.

A group of widely respected scientists entrusted with the task of criteria development drafted a set of benchmarks for the national reserve design, identifying percentage figures for the reservation of oldgrowth, wilderness, and biodiversity in conjunction with a suite of recommendations for off-reserve forest management; however, the draft was basically shunted. This meant that the work done by the scientists was referred back to a group of “experts within the bureaucracies and the bureaucrats at the higher policy levels” (Kirkpatrick, 1998, p.34). These ministerial representatives ... put a lot of “may” or “if it’s appropriate” etc., etc. in to it so that ... [the final targets] did not have any real force like in the original document. The ensuing changes allegedly led to the exclusion of the conservation of biological diversity on private land, left open the “question of the proportion of the reserve system that should be secure”, allowed for socio-economic provisos to modify the strength of the criteria initially proposed, and deleted “all reference to the maintenance of the unreserved forest in a largely native condition” (p.34).

The various changes to the draft criteria meant that the revised document, the later JANIS document, had “little scientific credibility” (Kirkpatrick, 1998, p.34). The JANIS figures were contested territory also because there was no theoretical or empirical basis for justifying 15 per cent ... over 12 per cent or 16 per cent or 50 per cent as a reservation target other than to say that it was far in excess of what was being promoted anywhere in the world at that stage. For reasons related to this absence of scientific justifiability strong opposition towards the criteria development was voiced from within the wider scientific community, which was fundamentally unhappy with putting quantitative restrictions on forest management and fundamentally opposed the whole concept and the set of criteria that were being adopted. It was feared back then that, because there was no scientific justification for the criteria, science and scientists were used to validate a political process. All in all, prior to the commencement of the Western Australian RFA, its scientific footing was - in the eyes of many stakeholders - already compromised.

The Western Australian RFA process, which commenced shortly after the States and the Commonwealth had reached agreement on the JANIS criteria in 1997, can best be described as acrimonious. Newspaper headlines at the time employed a language of open warfare to describe the climate in which negotiations over WA’s forests occurred, using terms like “battle” (Rees, 1999), “kill” (Buur, 1999), “war” (Rechichi, 1999), to mention only a few. Research participants also pointed towards a similarly tense atmosphere when describing the environment in which the science of the RFA was conducted. Much of the tension was considered historical, and there was an acknowledgement of a long history of acr-
serious dispute and debate in the scientific community over forest management in the south-west of Western Australia. It was felt that there was a general recognition among some scientists with expertise and interest in the area, that to speak critically of current management practices risked attack from some of the government departments working in the area.

The department referred to here in particular is the Department of Conservation and Land Management (CALM), whose responsibilities covered among other aspects both forest conservation and exploitation, the latter being its source of revenue. CALM stood accused - virtually since its inception in 1985 - of opaque public relations, intellectual suppression, the withholding of information, and specific cases of scientific censorship and perversion of the scientific process by CALM management as a means of protecting commercial interests. In particular, it was the forestry section of the department that attracted much public criticism for its perceived neo-positivist attitude towards forestry, which assumed sufficient knowledge of the impacts of current use and management practices on forest biota to confidently manage the forest estate. Also, what was perceived as an aggressive philosophy to timber cutting and as a categorical, and at times hostile, dismissal of dissenting views towards forestry was cause for much antagonism. Evidence of the department's philosophical stance and management style can be found on various public records (e.g. Lowe, 1993; Schultz, 1993; Nicholson, 1994a, 1994b, 1994c, 1995; Tan-Van Baren, 1996b, 1996a; Schoonbee, 1998) and in the scientific literature on forest management issues in Western Australia (e.g. Abbott & Christensen, 1994, 1996; Calver, Hobbs, Horwitz, & Main, 1996; Calver et al., 1998; Abbott & Christensen, 1999). In general terms, the positivism exuded by the department and the strong claims to objectivity and truth by some of its staff led to the perception of the department granting de facto protection of timber interests, meaning that scientific forest management and commercial forest exploitation were seen by many to have become synonymous terms.

Unsurprisingly, CALM's appointment as the State's lead agency for the RFA process in Western Australia was greeted with a sense of unease and was interpreted by many research participants to mean that the department was absolutely and completely in control of the process. This was because it meant that CALM, due to its involvement in forest matters, ... received a lion's share in terms of the funding and [that] they also ... had the lion's share in terms of involvement of scientists. Other scientists, however, did not consider this to be an accurate representation of the amount of science that [was] ... going on in the forests outside of CALM. In addition, many forest biologists in WA were ... employed by CALM and therefore not [considered] free to speak up. CALM's involvement in the RFA was contested also because much of the data [for the biological CRA studies] came from existing information held by the Department of Conservation and Land Management obviously as the primary data holder for forests in WA. It was questioned however, whether all the CALM databases ... were [made] available to CRA researchers.

Many of the CRA reports, which formed the scientific backbone of the RFA, were challenged by scientists and members of the public, especially those investigating forest ecosystem disturbance (mining, logging, fire, pests etc.). Common to all disturbance reports were comments by the authors in relation to the time they were given to conduct their reviews and compile their reports, which on average was a period of six weeks. This was considered an "extremely brief contract time-frame" (Lamont, Pérez-Fernández, & Mann, 1997, p.3), substantially limiting their capacity to critically reflect on, and digest, their often complex data (Horwitz, Jasinska, Fairhurst, & Davis, 1997; Major & Hetherick, 1997). Similar views were expressed by authors of other CRA reports who also argued that not enough time was given and to the extent that the time available was considered utterly inadequate.

Also, interviewees questioned whether ... short-term desktop reviews, which many of the studies were, [were] adequate for the topic[s] researchers were asked to look into, and numerous scientists complained that there was no scope to go and acquire additional data. To some interviewees the scoping of projects, which effectively prevented the collection of additional data, was deliberate and based on the attitude that: We don't want a particular sort of information, we don't want good data sets on this, we don't want to know. It was alleged that there was a guiding fear that if there [were] good quality data and they [were] in the public domain then the nature of the debate would change enormously. In relation to the disturbance reports it was repeatedly stated that the conclusions were extremely suspect in the sense that they ... [were] based on inadequate data and neither ... on a fair and comprehensive assessment of the entire forest region nor a fair and comprehensive assessment of the entire forest region nor ... on any assessment of major conservation requirements throughout the forest region.

Disputes also erupted over the issue of peer review. Peer review is considered a standard procedure in science with an aim to establish the validity and qual-
ility of research; it is supposed to keep the charlatans out of science and help maintain science as a process. In short, peer reviews to some extent legitimise science and are therefore considered a vital part of the scientific method. During the Western Australian RFA process complaints were made by scientists involved in CRA projects, suggesting that there has been an inadequate review process, that all reports went through some sort of haphazard review, an unclear process of incorporating the material found within them, and a stifled publication process in which the reports were made public. Confirmation of these assertions came from researchers and reviewers alike. Research scientists suggested that the peer review was a higgledy-piggledy mess in terms of how the reports were going to be dealt with, how they were going to be reviewed, how they were going to be assessed and handled.

On the reviewers' side it was revealed, for example, that a disturbance report copy ... received ... [for] review was clearly incomplete. This was being attributed to the assumption that the authors were not given adequate time and hence, in response to very pressing time deadlines, submitted a draft rather than a final version and then presumably, when a final version was received, that it was actually felt that the time was too short to actually go through with the review process. Thus, there was a sense that the process itself seemed to leave too little time for the actual preparation of the reports and then for the proper assessment of those reports once they were submitted.

Another issue of concern was data handling and data publication. Interviewees expressed considerable misgivings about how the reports were dealt with and how they were incorporated into the process. Participants were concerned that the people who were actually involved were not scientists and had no knowledge. Numerous interviewees held that the coverage of certain views was inadequate and that the process was failing to take into account the intensity of some of the scientific dispute that had occurred prior to the RFA. The issue of selectiveness was also addressed by Horvitz & Calver (1998) who, as part of their critique on the scientific credibility of the RFA process, took issue with the fact that much of the current scientific debates on aspects of forest management were ignored in the final CRA report. In other words, the CRA process was not only criticised for being selective about data derived from CRA reports but also for being selective about research conducted prior to the RFA.

The CRA reports were promised to be in the public domain for they were to form part of the “materials developed to assist community consultation” (Commonwealth of Australia and Government of Western Australia, 1998, p.7). However, not all reports were made available during the time of public consultation, which meant that the public’s ability to cross-reference the various documents made available for public comment was greatly impaired. This was considered a fundamental weakness by many RFA stakeholders because it was widely believed that the public needed to know what the processes were, why those reports were commissioned, what was important about each of the reports; in other words, the rationale for each report, and the public needed to have time to review and adequately assess all of these reports to enable the logic trail, the reason trail, and the paper trail to be followed from the commencement of the RFA process to the final decision.

Scientists' dissatisfaction with the science of the Western Australian RFA was widely publicised, mostly by conservation groups but also by scientists themselves with calls for a more open and genuine process. Such publicity fuelled widespread cynicism towards the RFA (distrust of the Western Australian RFA was growing also in response to other perceived procedural flaws of the process (see Bracken, 2002a)) and the science which it was supposedly underpinned by. The RFA created high expectations among community members who were told that the RFA [was] giving [them] ESFM, implying that the RFA would produce a sustainable outcome for WA’s forests. With the announced introduction of ESFM it was widely hoped for, especially among conservationists, that the big ticket issues of the forest debate, such as the allowable cut for indigenous hardwoods, and the logging of oldgrowth forests would be resolved (e.g. the community wanted to hear that we won't be logging oldgrowth forests anymore). Towards the end of the process however, not many people were confident that a lot of the public underlying disquiet about forest management in ... [the] State would be addressed by the process. Indeed, despite scientific support for the immediate reduction in logging levels and the cessation of oldgrowth forest logging, the RFA document, as signed in May 1999, endorsed an allowable cut that was in excess of what ... [was considered] sustainable and allowed, whilst protecting around 70 per cent of all oldgrowth, the continuation of some oldgrowth logging. A greater reduction in logging levels was postponed until 2004 to protect current timber contracts and employment in the timber industry, and the only partial protection of oldgrowth was justified on the basis that the areas still available for logging were considered “not [to] contain significant areas of oldgrowth or were not needed to
needed to meet nationally agreed criteria" (WA Parliamentary Debates - Hansard, 1999b, p.7890/1). The quality of the forest areas protected under the RFA was contested (see WA Parliamentary Debates - Hansard, May 1999) for many people believed that forests of high vulnerability and poor quality were being protected while high quality forests remained available for logging. To them the RFA was just favouring the timber industry and maintaining the status quo. The controversy surrounding sustained logging levels combined with the government's refusal to protect all remaining oldgrowth forests under the RFA ensured that, after the signing of the RFA document, the debate would continue and ultimately lead to the amendment of the RFA only eight weeks later, this time triggering condemnation from the timber industry who saw the changes as a gut reaction by government to what they perceived to be an overriding political need or political set of circumstances. In a sense, many thought that after three years of research and negotiation that the forest debate was almost back to square one.

Discussion

"All that science, and in the end it was all worth nothing"

- Western Australian Senator, 2000

The first question to be asked at this point is whether the WA RFA was a scientific process? What can be answered here in the affirmative is that the process tended to rely very much on the scientists, who were heavily involved in the process and that there were a lot of scientists involved, supposedly, we are talking about the top scientists in WA. Many RFA stakeholders saw a discrepancy, however, between the quantity and the quality of the science of the RFA. In WA, so it seems, the strength of the RFA was to be gauged on the amount of science and number of scientists involved in the process. As suggested by research participants, it was almost a numbers game, and the number of 500 scientists purported to have been involved in the process was stated many times during the RFA (see WA Parliamentary Debates - Hansard, 1999b). The philosophy behind such a scheme was described as a sort of religious blessing type approach to science, which means that a process would simply need enough science so that it has veracity. Indeed, high numbers seemingly meant that the RFA process [was] based on science. The main problem was though that science did not speak with one voice, neither prior to the RFA nor during the process. At times it was almost like having one group in the debate saying: Look, we have 17 scientists to say we are right, while another group was saying: We have 17 scientists to say that it is not right. Consequently, it was difficult to convey a sense of scientific unity on highly contested issues, and the stumbling block for the RFA seemingly proved to be (a) the way in which these scientific disputes were dealt with and (b) to what extent science would determine the final outcome.

The confrontational style towards problem resolutions, as indicated by interviewees, instilled the feeling in many RFA stakeholders that science was used as a weapon, which amounted to a manipulation of science. Many respondents believed that science was used to build a façade, a façade that the process would be using ... to provide [Western Australians] with answers, and that was publically acceptable, whereas in reality, the guidance, the levels of forest reservation and so on, was coming from elsewhere, and it was not coming from science. It was this blurring of science and politics that led many to believe that the RFA process has not been about science and overall that the scientific arguments were rather unimportant. A number of stakeholders, members of the timber industry in particular, had confidence ... in the scientific studies and the rigour of the assessment work, and even conservationists conceded that there was some good stuff in the WA RFA. Still, most were convinced that the RFA had nothing to do with logic or science and that it was all but a political process where [even] some of the science outcomes were political outcomes.

In relation to what the process delivered, many stakeholders believed that scientific outcomes were not necessarily reflected in the outcomes of the RFA. In other words, the nexus between what the science has found out and what actually happened was not [considered] particular strong. This feeling was also expressed in connection with the amendments of the WA RFA, which meant that the whole thing [was] dissolved ... in ten weeks via a ... resolution [that] was pretty much a spontaneous thing rather than an outcome of all that good science that had been done. As was put soberly, [policies came and go.]

It was this apparent treatment of science that was seen by many stakeholders to have damaged both science and the process, and it was held that if the science had been used honourably to really work out the best long-term reserve system, the best silvicultural methods etc., ... it could have been a much better outcome. It was argued by a number of participants that the RFA was damaged because people could not see how science was giving [them] the answer[s]. The perceived problem was that science could not give the answers because it was science that
needed to be given an honest direction, and they did not think that science was given that moral guidance. Moral guidance was deemed important, however, based on the view that science itself cannot make this last step to policy, ... to outcomes in the real world, ... the real environment, and in the forests. It could not ... [produce the answers] because the reductionist nature of science was in this particular case exploited as a weakness ... especially, its weakness as an integrating perspective was absolutely exploited to the maximum by the Department of Conservation and Land Management in order to control the process. It seems that very useful strengths of science to have that precision and that reductionist ability allowed that to occur.

Similar sentiments were expressed by research participants in a study undertaken by Bigler Cole (1998), whose work also examined the perceptions of science in the Western Australian RFA process with an emphasis on the nature of science itself. Her results also pointed to the exclusion and/or marginalisation of what was coined reliable scientists due to bureaucratic elements limiting scientific inquiries and placing restrictions on what scientists could either say or do. This was said to have been particularly true for government-employed scientists. Similar arguments were put forth by research participants in this study. Bigler Cole unearthed signs of institutionalisation and a strong sense of disinterestedness, objectivity, and truth among individuals working as scientists for government departments, a strong reminder of the basis for the ideological antagonisms between CALM and non-CALM scientists mentioned earlier on. Not dissimilar to the findings presented above, three quarters of Bigler Cole’s research participants questioned the empirical validity of the WA RFA process. Many expressed concerns about the secrecy involved in the process, a sense of distrust in relation to CALM, and much public confusion about the science of the RFA. She reported many criticisms directed against the CRA reports, identifying perceived deficiencies, as this study has, in relation to the quality of the CRA reports, the timeframes allowed for the CRA studies, the stifled publication process, poor public communication, and the lack of peer review.

So what? is the legitimate question one might ask at this point. What can be learned from this exercise and the insights gained? Many of today’s natural resource conflicts may best be characterised as wicked and complex due to overlapping, competing, and conflicting demands placed on complex natural systems by a diverse range of resource stakeholders. The difficulty here is, as suggested by Beer (1984), that complex systems with great variety are difficult to manage and require the limiting of the effects of such variety. Policy processes designed to resolve messy resource conflicts consequently need to deal with complexity and the issue of reducing variety. In situations such as these science, as happened in the case of the Western Australian RFA, is called upon to reduce complexity and to provide certainty and stability. This, however, comes at a risk of oversimplification in that approaches to limit the complexity of a system, according to Ashby’s Law of Requisite Variety, require the same amount of complexity as that of the system which they intend to reduce (Ashby, 1969). The RFA stakeholder data provide support for the suggestion that an oversimplification of the policy process occurred due to the adoption of a reductionist, closed-system, approach towards process design and policy formulation. The case study revealed perceptions of the political favouring of positivist forest science as a means of underpinning the economic status quo of the industry and the political status quo for the government and its forest department, extuding faith in forest management practices and dismissing dissenting calls for more precautionary approaches towards forestry. The RFA outcome was thus perceived as a product of the meshing of reductionist science and reductionist policy making, ostensibly excluding plural perspectives from the debate and instead conveying a message of scientific agreement and unity on contentious matters pertaining to the use and management of native forests. Dissent from this unified perspective, which came largely from scientists working outside the State’s government bureaucracy, was labelled nonfactual, emotional, and ideologically charged, while departmental forest science was portrayed as true and objective and free from ideology and value-laden assumptions. This serves as a reminder of the standard view of science mentioned earlier, which renders the work by unbiased and value-free specialists objective and correct (Bijker, 1995), meaning that science is equated with positivism and positivism with factuality. In contrast, scepticism or precautionism are considered value-laden and less, if at all, scientific.

Policy processes deal with the issue of integration; essentially, they are processes of integrating multiple perspectives. It follows that the scientific involvement in these processes requires science to also address the issue of integration, as suggested by Bigler Cole (1998), dealing with the integration of boarder issues, methodologies, logical and empirical assumptions. Yet, positivist dogmatism would hamper, even preclude, such integration leading to the marginalisation of alternative perspectives, which in Western Australia was compounded by the issue of censorship, im-
paired scientific freedom of speech, and methodological obstacles to scientific engagement in public discourse. Transparency, public scrutiny, and an open exchange of ideas are the lifeblood of science. This does not necessarily imply unity and agreement. In contrast, science needs a plurality of viewpoints and disagreement for the resulting tensions are often a driving force within science. Scientific homogenisation and forced singularity however, are potentially dangerous, especially within today's complex and rapidly changing environment. Ignorance towards, or suppression of, alternative perspectives can lead to metastasis (see Emery & Trist, 1965; Emery, 1997; Trist, Emery, & Murray, 1977) systemic blind spots, which in an applied policy context may result in wrong problem specifications and type-3 errors (after Mitroff, 1998) in policy outcomes (i.e. perfect answers to the wrong problem). The Western Australian RFA can be seen in those terms, which according to stakeholders represented a closed process that was ignoring the communities' wishes (e.g. the bureaucrats ignored the community) and marginalised dissenting scientists whose advice was ignored (e.g. they ignored all of our recommendations), which led to an outcome that missed the mark in political acceptability.

Environmental management is people management, and different people have different perspectives. Environmental policy processes generally deal with the solving of a community problem and hence face a similar problematique. Consequently, environmental policy-making is multi-dimensional for there are ecological complexity and multiple paradigms at work. For environmental policy-making to be effective the addressing of both social and ecological complexity is required. This is where science is expected to deliver integration. Policy processes, however, relying on a scientific façade are highly unlikely to achieve integration for they do not move beyond the earlier referred to religious blessing type approach to science, which does not allow for inclusion and plurality. Science is not at risk because of existing alternative perspectives and scientific argument. It is the way through which these disagreements are resolved that determines scientific credibility and the development of trust — the key ingredient to capacity building. The treatment of scientific disparity on environmental matters exhibited in Western Australia, which was largely based on philosophical and ideological differences between departmental and non-departmental scientists, can serve here as an example. Non-government scientists working outside institutional constraints repeatedly called for a widening of the focus of RFA science, transparency, inclusion, and collaboration as well as a slowing down in the pace of environmental commodification and greater precaution in the face of risks relating to the management of the State's native forests (e.g. Horwitz & Calver, 1998). Yet, perceptively due to short-term economic and electoral imperatives, which require ad hoc solutions, people's ability to slow down and take time to reflect was effectively limited. The timing and scoping of CRA projects in Western Australia are a case in point where political decision makers guided by political pragmatism - backed by departmental science - ignored calls for additional data, more time, and more in-depth analyses. It is these types of process constraints that essentially produce predetermined process outcomes and prevent transformational change and therefore undermine science and preclude the development of trust in science.

Political processes need science, and credible political processes depend on credible science. Science can only be credible, however, if allowed to follow its processes and protocols. This is what political processes need to enable and allow. There ought to be a recognition that scientific processes differ in nature from political processes. These differences lie in timeframe, structure, and agenda, and by treating both processes the same, science can become dysfunctional through the loss of integrity and credibility, damaging both science and the political process. Certainly, political reality demands that compromises need to be made, especially in relation to time, but this does not need to occur at the expense of the integrity of science. Science's role in political process is always going to be instrumental in that science plays an informing role. Traditionally, the informants were assumed to be objective experts without motivations, values, and ideologies, a view which denies the existence of allegiances, biases, and assumptions. A new form of honesty or transparency may be needed to allow science as the process informant to become more contextual, meaning that scientific data is made available in conjunction with assumption specifications that can be publicly scrutinised and debated. An approach such as this would not only help overcome allegiance problems in that professional constraints would be acknowledged but also effectively minimise the risk of the political abuse of science. Yet, this form of overt politics would require a radical shift in the perception of science-politics relations.

Inductivism maintains that science transcends politics and in a sense justifies them. Science, however, is not apolitical for it operates from within a context, that may be institutional, societal, or professional. Different contexts mean different values and different assumptions. In other words, scientific data is value-laden data (after Mitroff & Emshoff, 1979), a
point which Lienes (1998, p.87) illustrates rather well by saying that:

"The certainties of science are as pluralistic, as conflicting and as subject to opinion as politics or economics or any other human enterprise. The procedures of 'objective' inquiry are just as much modified by self, by fantasy and folly as those of subjective inquiry."

Inductivism and positivistic science generally reject this notion as postmodern relativism, which is feared to damage science and render it obsolete. But how can science lose credibility and how is its value being diminished when assumptions are made transparent and the processes of data generation and analysis made open to peer review? Would it not be the denial of context and bias that would undermine the credibility of science in future policy processes?

In times of intensifying environmental problems there is a real need for effective environmental policymaking. Environmental policies can only be effective, however, if they enjoy community support and can be trusted. In light of the case study data presented above it seems reasonable to suggest that perhaps more overt environmental politics are needed in order to (re-)gain public trust in political processes and their supporting sciences as well as the trust of science and scientists in their role in these political undertakings. Without trust and the development of a trust culture, capacity building cannot occur and much needed environmental restoration and protection are delayed. While some institutional/departmental science may thrive in a climate of public distrust and cynicism, the case study data of this research suggests that that type of society-science relations are ultimately unhealthy and potentially lead to dysfunctional processes of policy formulation.

Conclusion

An attempt has been made in this paper to provide an understanding of stakeholder perceptions of science within a political process and to identify the lessons that may be learned from this. The Western Australian case study data has revealed that covert politics and political interference in scientific processes were responsible for a climate of public distrust, which ostensibly led to the rejection of a political process resulting from a lack of credibility.

In this context, consideration was given to a new approach to the relationship between science and policy-making involving science in political processes based on the recognition of science's political nature and acknowledging scientific process requirements as being distinct from political process requirements. A new form of transparency has been suggested, premising public deliberation on contextually grounded scientific data. It is believed that the inclusion of values and assumptions would allow for a more open and honest debate, which in turn may improve the public's understanding of science, political processes, and their interactions and so enhance the quality and durability of policy outcomes.

References

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Beatty and Sons.
Reclus, V. (1999, 12th January). Five acres as war cemeteries in
forests. West Australian.
Reen, T. (1999, 12th January). Georeics and Geneas take off the
gloves. West Australian.
of Chicago Press.
Philosophical and Sociological Theories of Science." Melbourne:
Melbourne University Press.
Fontana.
from Australia: Environmental Justice and Legal Process. Cape
Town.
London: Cambridge University Press.
Stenner, A. & Coughlan, J. (1999). "Radar of qualitative research:
Grounded theory procedures and ethnography." Newbury Park, CA:
Sage Publications.
Australian, pp. 22.

Ten-Van Baren, C. (1996b). CALM Civic Defended. West Australi-
an, pp. 5.

ement of Science. A Transcath Anthology (Vol. 3). Philadelphia: Uni-
versity of Pennsylvania Press.

WA Parliamentary Debates - Hansard. (1999a). Regional Forest
Agreement - Matter of Public Interest (pp. 7860 / 7881). Perth:
Parliament of Western Australia - Hansard.

WA Parliamentary Debates - Hansard. (1999b). Regional Forest
Agreement - Scientific Process (pp. 9390/9393). Perth: Parlia-
ment of Western Australia - Hansard.

WA Parliamentary Debates - Hansard. (June 1999). Regional
Forest Agreement - Scientific Process (pp. 9390/9393). Perth:
Parliament of Western Australia - Hansard.

WA Parliamentary Debates - Hansard. (May 1999). Regional Forest
Agreement - Matter of Public Interest (pp. 7860 / 7890). Perth:
Parliament of Western Australia - Hansard.

Expertise, the Lay Public, and Water Management in the West-
erm United States. The Environmental Professional, 17, 152-166.

Wyner, B. (1993). "Knowledge in Context. Theory, Knowledge,
and Human Affairs." 16(1), 111-121.

democracy work in a complex world." Syracuse, NY: Syracuse
University Press.