Ecological Modernization vs Sustainable Development: The Case of Genetic Modification Regulation in New Zealand

Jeanette Wright & Priya Kurian

Political Science & Public Policy
Faculty of Arts and Social Sciences
The University of Waikato, Hamilton
Email: pkurian@waikato.ac.nz

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Abstract

Ecological modernization and sustainable development are the two dominant paradigms in environmental policy. This paper assesses the implications of competing understandings of ecological modernization and sustainable development using the case of genetic modification regulation in New Zealand. Although the New Zealand regulatory framework embraces the symbolic language of sustainability, it ultimately adheres to a narrow notion of ecological modernization. By adopting a technically-driven risk management process and a diluted precautionary approach, alongside limiting public input into decision-making on genetic modification, it undercuts its commitment to sustainable development definitionally and procedurally. Analysis of the New Zealand biotechnology policy regulatory framework, which consists of the Hazardous Substances and New Organisms (HSNO) Act and the Environmental Risk Management Authority (ERMA), shows how institutionalization of a narrow conception of ecological modernization can preempt real commitment to sustainable development.

Introduction

New Zealand's assiduously cultivated image of being 'clean and green' remains a fragile identity, threatened in large part by a lack of political will to take steps necessary to protect the environment in the face of a ubiquitous pressure for economic growth. Perhaps the most significant public challenge to the New Zealand government's symbolic commitment to environmental sustainability in the last decade has been the hugely contentious issue of genetic modification (GM). Public protests about GM led to the setting up of the Royal Commission on Genetic Modification (RCGM) in 2000, which recommended that the government 'proceed with caution' with GM (RCGM, 2001). In October 2003, the government allowed a moratorium on releasing genetically modified organisms (GMOs) into the environment to expire. Separately, an application to conduct GM experiments for inserting human genes into cattle was approved. Both steps sparked protests from activists, prompting major public demonstrations and marches (Kurian and Munshi, 2006). More recently, in February 2009, a 'botch-up' in a field trial of GM vegetables in Lincoln led to the shutting down of the trial (*New Zealand Herald*, 11 February 2009), while in June 2009, the New Zealand High Court ruled against a decision by ERMA to permit broad-ranging GM experiments by a research institution

(*New Zealand Herald*, 7 June 2009). Thus, GM is an issue that continues to have significant public and political salience in New Zealand.

New Zealand is a relative latecomer to the debates around GM and GM regulation. Unlike elsewhere where there was some recognition among scientists as far back as the 1970s of the potential problems with GM and its regulation (Wright, 1986, 1994; Goodfield, 1977), it was only in the 1990s, for example, that relevant legislation and policy was passed in New Zealand.[1] The most crucial policy measures included the HSNO Act (1996) and the Environmental Risk Management Authority (ERMA) Methodology Order (1998). ERMA, set up to implement the HSNO Act, is the key institution in the decision-making process around genetic modification. The creation of these regulatory mechanisms is set against the background of New Zealand's drastic neoliberal economic reforms between 1984-1990, marked by the corporatization and privatization of state-owned assets, and the roll-back of the welfare state (Kelsey, 1997; Larner, 2002). These reforms coincided with a series of environmental initiatives, including the Environment Act of 1986, which led to the creation of the independent Office of the Parliamentary Commissioner for the Environment, [2] the Department of Conservation with an advocacy role on conservation, and the Ministry for the Environment. This was followed by the Resource Management Act 1991, which requires integrated resource management based on sustainable environmental management principles. These institutional innovations have given New Zealand a reputation as a world leader in environmental policy (Bührs and Bartlett, 1993; Bührs and Christoff, 2007), with an explicit commitment to sustainable development (Department of Prime Minister and Cabinet, 2003). At the same time, a number of recent studies (see, e.g., Jackson and Dixon, 2007; Ministry for the Environment, 2008) suggest that current weak regulatory approaches and a concern with short-term economic growth are failing to embed sustainability within New Zealand quickly enough to offset New Zealand's environmental impacts.

It is in this socio-economic-political context, ridden with seemingly contradictory impulses, that we examine the issue of GM and its regulation in New Zealand. GM, and

[1] This was largely because New Zealand was extraordinarily late among OECD countries in establishing an institutional mechanism for control and regulation of pollutants and all kinds of hazardous substances.
[2] Bührs and Christoff (2007, p. 230) describe the creation of the office of the Parliamentary Commissioner for the Environment as a world first, vested as it was with 'the combined functions of environmental ombudsman, auditor and systems guardian'.

biotechnology more broadly, is an issue that poses significant challenges to existing societal institutions (see, e.g., Hajer, 1995; Beck, 1992). In liberal democracies, a society's ability to respond to such challenges is manifested in the ability of its regulatory institutions to manage public anxieties to risk, while ensuring on-going conditions of business profitability (Dryzek, 1995). Environmental politics, thus, is 'a site where the established institutions of society are put to the test' (Hajer, 1995, p. 39). The response in affluent, First World states has been to adopt the paradigm of ecological modernization (EM) that seeks to deliver both economic growth and environmental protection primarily through technological innovation (see Hajer, 1995; Dryzek, 2005; Milanez and Bührs, 2007). As a theory, EM provides an explanation for how institutions, practices, and governance structures respond to the environmental imperatives of our time in the context of a capitalist economy.

A key question in the on-going debates around EM is whether a commitment to EM can also deliver on the goal of sustainable development. As Christoff (2000, p. 213) points out in a discussion of EM, 'if these new technologies and products are truly ecologically sustainable, they will lead to a significant absolute decrease in resource use and to effective environmental preservation'. Where GM is concerned, an added complexity is that GM, an ultra-modernist technological development grounded in science, simultaneously embodies both risk to the environment and human health (in the eyes of the public), and the promise of economic growth (in the eyes of the state and industry). In addition, scholarly analyses of regulatory institutions suggest that there are biases within current genetic modification policy and decision-making processes that work to exclude ethical and socio-cultural concerns around risk, often raised by environmentalists and the broader public (Morgan and Archibald, 2000; Toke, 2002; Levidow, *et al*., 2007). With a few important exceptions (Goven, 2006, for example), however, there is little attempt in these works to explain *how* this bias is systematically maintained and indeed fostered in the socio-economic context that frames political decision-making. There is, therefore, a critical need for analysis that allows 'better understanding of what has produced these outcomes and how' (Bartlett, 1994, p. 176), allowing us thereby to explore the implications of hegemonic value systems for moving towards the goal of sustainability.

Using critical discourse analysis (CDA) (see Fairclough, 1989; 1995), we assess in this

paper the extent to which the GM regulatory framework in New Zealand (embodied in the HSNO Act and ERMA Methodology) adopts an EM approach by providing for environmental and economic benefits. We also examine how this regulatory approach impacts on the broader goal of sustainable development, which better encapsulates the complex and embedded nature of environmental, social, and cultural concerns—including issues of risk management, scientific uncertainty, as well as the place of science and expertise—around new technologies such as GM. CDA draws attention to the political and ideological significance of words. For CDA, a further site for the maintenance of hegemony is the discursive practices within institutions. These social practices and discursive strategies are articulated within political institutions, whose norms of appropriateness, rules and routines define the framework within which politics takes place (March and Olsen, 1989). The application of CDA thus allows us to explore the political implications of notions of ecological modernization and sustainable development that play out in the institutional and regulatory context of the HSNO Act and ERMA in New Zealand. We begin with a brief overview of sustainable development as a prelude to a detailed discussion of EM.

Sustainable Development and Ecological Modernization

Sustainable development and ecological modernization have been the dominant paradigms in environmental policy since the 1980s. Both remain ambiguous and heavily contested concepts, lending themselves to multiple interpretations by environmental scholars, policymakers, and activists (Redclift, 2005). The discussion that follows identifies the key characteristics or indicators of the two concepts that serve as the basis for the analysis of the GM regulatory framework in New Zealand.

Sustainable development, most commonly defined as 'development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development [WCED] 1987, p. 43), is a goal that most states (including New Zealand) subscribe to. As described by the WCED, sustainable development requires meeting the legitimate and just needs of the world's poor and of future generations, while recognizing the idea of 'ultimate limits' imposed by available technologies on the ability of the environment to meet present and future needs (see WCED, 1987, p. 43). Thus, the ideas of social justice,

equity, and ecological sustainability on a global scale are fundamental to the paradigm of sustainable development (Lafferty, 1996; Meadowcroft, 2000; Dryzek, 2005; Langhelle, 2000). The sustainable development agenda invokes a broad range of ethical, socio-cultural and political-economic issues. These include, for example, the Bellagio Principles (Hardi and Zdan, 1997, cited in Hilden and Rosenstrom, 2008, p.239) that call for 'openness, communication, broad participation, iterative processes, sufficient institutional capacity and the need for a coherent framework' to bring about sustainable development.

Although a ubiquitous term, the meaning of sustainable development remains contested. As Blowers (2000, p. 371) argues, it is 'at once a concept, a process, a goal of policy and an ideology'. No matter in what form it manifests, sustainable development tends to endorse capitalist economic growth (see, e.g., WCED, 1987). Given its fluidity, sustainable development is viewed with some cynicism by scholars who see it in its reformist guise as a discourse coopted by economic and political elites to get on with business as usual (see, for example, Doyle & McEachern, 2008). Yet, as a normative concept, it continues to retain a broad moral and political appeal, which has allowed for greater public participation in environmental management, and served to internationalise environmental policy making (Meadowcroft, 2000). Thus, both as an ideal and as goal of policy, the discourse of sustainable development lends itself to fulfilling the ends that environmentalists desire.

In contrast to the breadth and scope of sustainable development, ecological modernization[3] emerged in the context of First World states in the 1980s as a 'modernist and technocratic approach to the environment that suggests there is a techno-institutional fix for the present problems' (Hajer, 1995, p. 32). For governments confronting the dilemma of the assumed conflictual relationship between economic growth and environmental protection, EM has become the policy approach of choice in interpreting and implementing the goal of sustainable development (Murphy, 2000; Huber, 2000; Jackson and Dixon, 2007). The discourse of EM suggests that by judiciously mixing regulations and market-based instruments to correct market failure, EM will lead to both economic growth and environmental protection (Svedin, *et al.*, 2001; Dryzek, 2005). In the process, EM as a policy approach is often seen to jettison broader concerns with

[3] For an overview of debates and discussions on ecological modernization, see, for example, Mol and Sonnenfield (2000); Young (2000); and Milanez and Bührs (2007).

social justice and global sustainability, while requiring a more limited level of structural change in society than that called for by sustainable development (Murphy and Gouldson, 2000; Langhelle, 2000; Barry, 2005).

As an ideology and a policy response, EM facilitates greater governmental intervention through stronger regulation in ensuring environmental protection while leaving untouched the functioning of a capitalist market economy. Hence, central to EM are policy measures and principles such as 'polluter pays', mandatory environmental impact assessment, the precautionary principle, and the principle of the scientific burden of proof (O'Riordan, *et al.*, 2001). Such policy responses—essentially a design response to environmental degradation ensuing from industrialization—are a way of internalizing or preventing environmental costs, ensuring on-going economic competitiveness in a global economy (see Orsato and Clegg, 2005).

EM theorists argue that by pursuing greener growth through a process of continually improving environmental productivity by means of new technologies, a close-looped eco-efficient production system could be developed, decoupling in the process economic growth and environmental deterioration (Eckersley, 2004). This approach has been adopted particularly by First World states as a means of mitigating or reducing environmental impacts in the short to medium term as a means of moving towards the sustainability goal (Dryzek, 2005; Milanez and Bührs, 2007). In essence, EM was readily accepted as a policy instrument as it did not require major structural change, was primarily concerned with means (greener growth) rather than ends, and could be easily administered by technocratic policy makers within traditional regulatory regimes, and through industries using such instruments as voluntary accords (ibid.; Eckersley, 2004).

Some scholars distinguish between a technocorporatist/weak and reflexive/strong EM (Hajer, 1995; Christoff, 2000). But, drawing on a comprehensive survey of EM scholarship, Milanez & Bührs (2007) offer a more narrowly delineated definition of EM, identifying its constituent or core elements, with a focus on material impacts:

> EM can be understood as the implementation of preventative innovation in production systems (processes and products), that simultaneously produces environmental and economic benefits (Milanez and Bührs, 2007, p. 573).

It is worth noting that with this definition, EM may well be achieved without public participation in decision making. Similarly, the presence of public participation does not in itself guarantee that EM will occur. In contrast, from the standpoint of sustainable development, enhanced public participation is seen as vital for ensuring better environmental outcomes, legitimising decision-making, and ensuring that policies and regulations have wide public acceptance. In addition, it is evident from the scholarship that for EM to take place, experts are relied on for technocratic risk analysis that informs environmental decision making, and a primary focus is given to cooperative relationships between the state and industry with a strong reliance on transparent regulatory frameworks that clearly outline rules and responsibilities. Clearly, EM ignores many of the issues involved in the long term goal of sustainable development, leaving open the question of whether EM can lead to sustainable development. Drawing on the above discussion, the key elements of EM and sustainable development are identified in Table 1 (below).

[Insert Table 1 here]

Genetic Modification Regulation in New Zealand

In the case of New Zealand, we can ask to what extent does New Zealand's regulation of GM adopt an ecological modernization approach? What are the implications of the regulation of GM for the goal of sustainable development? Addressing these two related but distinct questions allows us to examine whether in the case of GM regulation in New Zealand, EM can be a pathway to sustainable development. Alternatively, we can ask whether EM, as Beck (1995, p. 69) suggests, only perpetuates 'organised irresponsibility' and permits the continued production of ecological problems because it is still working within the economic and bureaucratic structures which generated the problems in the first place? The GM issue is particularly relevant to assess the potential of a regulatory framework to institutionalise a commitment to sustainable development for a variety of reasons (see Toke, 2002). For example, it raises significant questions around the possible impacts of the release of genetically modified organisms (GMOs) on the environment. Are genetically modified food crops likely to 'contaminate' non-GM food crops? Could GM crops be harmful to animals that may consume them? Could there be horizontal gene transfer or other unanticipated genetic impacts through the creation of genetically

modified organisms/animals? In addition, GM raises questions around scientific risk and uncertainty, the role of experts, the place of public concerns and values in policy development, as well as cultural and ethical concerns that have implications for a broad understanding of ecological sustainability.

A more limited set of concerns may be raised about GM from the perspective of EM. A central aspect of EM is the potential for regulation to promote improvement in the economic and environmental performance of industry (Murphy and Gouldson, 2000). That is, 'strict environmental regulation by government is seen as a way of driving the innovation process in industry' (ibid., p. 35), which would reduce environmental impacts and enhance economic efficiencies. GM clearly exemplifies a form of technological development that is 'closely associated with the notion of modernization and progress' (Toke, 2002, p. 145). GM proponents see the industry as built on scientific expertise and argue that their new, innovative technologies provide efficient, environmentally sound, and economically beneficial means of producing useful products, be they medicines, nutritionally-enhanced foods, pest-resistant plants that do not require the use of chemical pesticides, or others (see, e.g., RCGM, 2001).

In analysing whether New Zealand's regulation of GM adopts the principles of EM, it is important to note the limits of such an analysis. Although the concept of EM can examine some aspects of GM, 'the GM food/crops issue is about more than the environment' and hence EM is unable to fully address all aspects of it (Toke, 2002, p. 151). Given that EM does not guarantee the achievement of sustainable development (see, e.g., Pepper, 1998; Christoff, 2000; Milanez & Bührs, 2007), it is critical that the analysis of the regulatory framework for GM takes account of the possibilities for achieving sustainability via EM.

This article analyses the extent to which the regulation of GM in New Zealand allows for both economic and environmental benefits by reconciling the competing pressures of environmental and economic imperatives. Furthermore, it explores whether the regulatory system takes into account and meaningfully addresses the ethical, socio-cultural and political-economic issues underpinning GM that would be fundamental to embed sustainable development in practice. In doing so, it applies the key elements of EM and sustainable development, summarized in Table 1.

The Legislative Context for the Regulation of GMOs: HSNO Act (1996)

In New Zealand, the HSNO Act (1996) established the new regulatory procedures for dealing with the uncertainty of new organisms and hazardous substances. From the outset, the introduction of this legislation suggested that there was no questioning of whether experiments such as rDNA experiments should be restricted. Indeed, the assumption was that developing these new technologies was common sense despite the limited scientific understanding of GMO risks and of their potential negative effects on the environment. However, for the first time in New Zealand law, the Act explicitly stated that the protection of the overall environment and people should inform the management of environmental risks.

The HSNO Act states that the 'Purpose' of the Act is:

> To protect the environment, the health and safety of people and communities by preventing and managing the adverse effects of hazardous substances and new organisms (HSNO Act 1996, Part II 4).

The assumption is that in providing this protection, decision makers were now required to prevent (anticipate) and manage the adverse effects of GMOs, rather than ameliorate (react and cure) their effects. The stated purpose of the Act thus demonstrates an incorporation of an EM discourse into its text that is also reflective of a commitment to sustainable development.

A similar focus on sustainable development is reiterated in the 'Principles' of the Act (HSNO Act, Part II), which stipulate that implementers must 'recognize and provide for': the protection of ecosystems; the maintenance of people's capacity to ensure their socio-cultural and economic well-being; the need for caution in managing adverse effects, where there is scientific and technical uncertainty about these effects; and the Principles of the Treaty of Waitangi.[4] The concern for a precautionary approach aside, none of these

[4] The Treaty of Waitangi, signed in 1840 between over 500 Maori chiefs and representatives of the British Crown, is New Zealand's 'founding document', which set the terms by which New Zealand became a British colony (State Services Commission, 2005).

elements are necessary for EM (see Milanez & Bührs, 2007), but are vital to sustainable development as a normative goal.

Another example of embracing a key aspect of sustainable development is the inclusion of the need for respect for cultural diversity (see discussion on Maori involvement in ERMA processes later in this article). In addition, the 'Principles' and 'Purpose' of the Act show that more than positivistic scientific rationalities and values have been included in the boundaries of consideration of decision makers. For example, the inclusion of 'intrinsic value of ecosystems' (II b) suggests that ecosystems will be viewed as ends in themselves, have value for their own sake, and therefore are 'deserving of moral consideration in their own right' (Eckersley, 1992, p. 61). This clause could be interpreted as recognizing an ecological perspective that validates a non-utilitarian, non-instrumental approach to ecosystems and living organisms, again reflective of a broad commitment to sustainable development.

The main tenet of EM, which is also an aspect of sustainable development, is that economic growth and environmental protection can be reconciled through technological innovations and improvements to current institutional arrangements. The HSNO legislation clearly adopts this view. It specifies the need to 'take account of' the economic and related benefits to be derived from the use of a particular hazardous substance or new organisms (II e). There is also an explicit requirement to 'take account of' cultural, ethical and environmental values (II c, II d, II 8), and the need to 'safeguard' the environment and people (II 4, II 5, II 6) when managing the scientific risks of GMOs. Indeed a broad and inclusive implementation of these requirements may well be seen as reflecting a commitment to the principles of both EM and sustainability.

However, the mediation of the public(s)' views through experts appears a weak approach to community participation with the control of the debate remaining firmly in expert hands within institutional boundaries. Coupled with this, the legislation only views the need for 'caution' in managing scientific and technical uncertainty (Part II 7); significantly, however, 'caution' is not required to be equally applied to cultural uncertainty. This suggests that in evaluating the effects of GMOs the implicit ideological assumption embedded in the HSNO Act is that scientific risks and uncertainties, rather than social and cultural issues, are the key concern, reflecting an attempt to etch a boundary between 'science' and 'culture' in managing a politically fraught issue. Both in

its limited view of public participation and the privileging of scientific discourses over cultural and ethical discourses we can see elements of EM that may undermine the goal of sustainable development.

Discursive Implications

We turn next to the discursive implications of what the HSNO legislation requires as the most appropriate practices for preventing or managing the adverse effects of GMOs. The HSNO Act established the Environmental Risk Management Authority (ERMA) (IV 14) and required ERMA to develop a methodology to guide decision-making (II 9), which must include an assessment of the monetary and non-monetary risks, costs and benefits of the adverse effects of new organisms (II 9) . Clearly, the HSNO Act, while tantalisingly suggesting a commitment to sustainable development, was hesitant to radically change the rules, regulations and conventions already established for environmental risk management. Barry (2005, p. 315), in fact, argues that the success of the ecological modernization approach and its adoption in environmental policymaking is precisely because it poses little risk to the status quo:

> Environmental interests are considered only to the extent that these interests can be translated into the economic language of a cost-benefit calculation. In order for the environment to be protected, it must first be demonstrated to be a resource … with some immediate economic benefit…. One of its main reasons for its political success and attractiveness as a state strategy … is that it… economises the environment…. rather than ecologising the economy.

Likewise, the HSNO Act (1996) requires that scientific analysis remains as the most 'rational' approach to risk analysis**.** Part V (29) outlines 'what should be included in any assessment for new organisms' and 'under what circumstances the ERMA decision makers could decline an application'. The legislation states that decision-makers under Part V (29) can only decline an application if the scientific analysis reveals the potential risks of the new organism as too high. This constructs an immediate boundary, which situates cultural and ethical analysis of high risks as not being sufficient reason to stop

new organism applications being approved. Clearly, the HSNO legislation, by prioritizing scientific risks and technical solutions, views scientific rationalities and values as inside the framework of consideration, and ethical and cultural rationalities and values as outside. In doing so, it fails to acknowledge what critical policy scholars have long argued, namely, that science is a collection of socially situated cultural practices. The New Zealand GM regulatory system appears to understand science as a unitary, homogeneous perspective, which ignores the fundamentally more complex reality of how science functions. The ERMA legislation, accordingly, expects science to do something it rarely is ever able to do, because scientific analysis rarely yields unambiguous results; this is not only because risk assessment is based on judgments that cannot be reduced to science but also because there are multiple knowledge systems, outside of science, based on different ontologies and epistemologies. That science, in fact, is a dynamic collection of many complex and sometimes incompatible value judgments and actions, all of which have epistemological limitations, is something too often ignored by the GM regulatory institutions. While EM does not require a recognition of knowledge systems other than western science, a commitment to sustainable development invokes a pluralist and complex understanding of knowledge.

In summary, the HSNO legislation reflects an intertextual collision of ecological modernization and sustainable development discourses. On the one hand, the 'principles' and the 'purpose' emulate the trend in environmental thinking towards sustainable development (i.e. through acknowledgement of the importance of ecological sustainability, public participation, inclusion of different cultural ethics, indigenous views and ecological science), which indicates that both normative and empirical values need to be incorporated into decision-making. But the ambiguity of the principles (II 5-8) with their mildly worded 'take account of' and 'take into account', demonstrates that the principles of the legislation are open to subjective interpretation by decision-makers as to how much or little weighting they will be given in decision-making. In keeping with EM, the Act sees no apparent incongruity in the establishment of a science-based risk management body to oversee the implementation of the Act, or an expert-led 'Authority' to make decisions on applications. Such a risk management model as a decision-making framework relies on instrumental and utilitarian rationalities for validity, and views moral arguments as irrational (Fischer, 1995). The approach to GMO risks that the HSNO Act

established for ERMA (and which, as we will see in the next section, was consolidated within their methodology) gives preference to scientific and economic discourses over broader cultural and ethical concerns. Such a process can therefore potentially 'help legitimize an expert basis for regulatory decisions, but this basis remains vulnerable to further politicization' (Levidow, *et al.*, 2007, p. 59).

The wordings of the Act illustrate what Fairclough (1989; 1995) terms the social and ideological work of language, the mechanisms by which the legislation textually provides for ambiguity of meanings, and maintenance of social control in expert hands. From a critical perspective, it demonstrates that texts are socially situated, where words have political and ideological significance, and particular structuring of words and relationships between meanings of words can be forms of hegemony.

The Environmental Risk Management Authority (ERMA)

As required under the HSNO Act (1996), ERMA has developed a Methodology Order (ERMA, 1998), which describes the framework for the ERMA process. Linked to this framework is a plethora of protocols, discussion documents and technical guides which outline how the ERMA Methodology should be interpreted (see, for example, ERMA, 1999a; ERMA, 1999b; ERMA, 1999c; ERMA, 2000). The Methodology has established a risk management framework, including in its purview the precautionary approach, with an emphasis on establishing the risks, costs, and benefits of GMOs with regard to their scientific, cultural and environmental effects. We examine these from EM and sustainable development perspectives to explore what constraints and impacts this will have on decision-making on GMOs.

The requirements under the Act to use a risk management model for the ERMA Methodology accept that risks are inevitable by-products of new technologies, and are acceptable because new technologies are needed for economic progress. This approach assumes that both costs and benefits can be assigned to GMO risks, thereby taking a purely consequentialist approach—that is, the only thing important is consequences, which excludes many ethical and political considerations—and it assumes that all consequences can be unambiguously and nonpolitically classified as costs or benefits. Furthermore, it assumes that it is possible to objectively quantify adverse effects of

GMOs and to compare them in terms of a common metric. Thus, the ERMA Methodology, like the HSNO Act, gives an ideological primacy to monetary costs and benefits, and to a dominant scientific discourse that is in keeping with EM principles, while clearly undermining the goal of sustainable development.

The Annotated Methodology shows this prioritization of scientific values and expert decision makers:

> When evaluating risks, the Authority *must begin* with a consideration of the scientific evidence relating to the application [25.1] (ERMA 1998, 13, emphasis added).

It also emphasizes that ERMA's role is to 'provide advice solely on the basis of an objective and expert review' [3.1(a)] (ERMA 1998, 8). This approach embodies Fischer's (1995) notion of the ideology of 'technocracy' in which technical solutions are provided for political problems. It reflects too the 'scientization of politics', whereby political and social issues are seen to be 'better resolved through technical expertise than democratic deliberation' (Bäckstrand, 2003, p.24).

The Methodology of ERMA consequently establishes the problem of genetic modification as a technical problem in which risks can be determined as either insignificant, or, if significant, able to be adequately contained through current containment standards or the adding of additional controls. For example, Clause 12 of the Methodology assumes that risks, costs and benefits are quantifiable and Clause 29 that any uncertainty is uncertainty only of the scientific risks, which can be adequately clarified by experts. Alongside not including cultural uncertainty, this approach presumes that scientific uncertainty is unproblematic (ERMA, 1998).

Yet the problem with using risk assessment when dealing with uncertainty is clearly pointed out by Wynne (2000):

> The inherent assumption in the science of risk assessment is that it is capable of dealing with uncertainties… the outcome of such assessments is a scientific quantification of risk, which can then be considered for its acceptability. But the uncertainties that can be recognized scientifically are only the known

> uncertainties. This totally and silently excludes from consideration the unknowns, which (historically) have resulted in unanticipated consequences (n.p).

The environment appears to be reduced to something in which problems can be compartmentalized and quantified. This approach fits well within an EM framework whereby EM occurs when the regulatory focus is on the implementation of preventative innovation in production systems (processes and products) which simultaneously produce environmental and economic benefits. Clearly, the New Zealand legislative context is more concerned with material impact of new GM technologies than cultural or social impacts. ERMA, in using a risk/cost/ benefit approach, positions the potential economic benefits of these new technologies as a way of counter-balancing any prospect of environmental harms.

A justification for this reductive approach is found in ERMA's interpretation of precaution. The ERMA 'Approach to risk' discussion document (ERMA, 2002a) clarifies how the ERMA methodology and hence the Authority in their decision making should interpret the requirement of the HSNO Act (II 7) that a:

> Precautionary approach should be exercised by all persons exercising powers and duties… and that they should be cautious in managing adverse effects where there is scientific and technical uncertainty about these effects (HSNO Act II 7, 15).

The 'Approach to Risk' document states that the Precautionary Principle 'embodies fundamental values related to society's expectations for environmental management and the concept of sustainability' (ERMA, 2002a, p. 10). But 'because it is difficult to implement the Precautionary Principle', it advocates the '*precautionary approach*' as a 'pragmatic way of dealing with uncertainty and ignorance' (ERMA, 2002a, p. 10). Separately, the ERMA Authority issued an Evaluation and Review Report on a specific application where it endorsed taking a *precautionary approach*, as 'it does not require such evaluation of society's expectations' (ERMA, 2002b, 10). Secondly, 'when taking account of lack of scientific knowledge about long-term outcomes, or where cause-effect relationships are not fully established, a precautionary approach requires an analysis of compensating benefits while the precautionary principle does not' (ERMA, 2002b, p. 10).

The precautionary approach sits better in their view with the expectations of a risk/benefit framework because:

> Risk assessment and the adoption of a precautionary approach are not mutually exclusive. In practice it is often sensible to adopt a precautionary approach *within* risk assessment. This can be done at two levels: by being *cautious* when making estimates of likelihood and magnitude of effects, and by being *cautious* in making decisions based on risk estimates (ERMA, 2002b, p. 13, emphasis added).

What we see here is an extraordinary redefinition of 'precaution' to mean 'caution'. Whereas 'caution' means effectively 'to proceed with care', precaution explicitly means 'not to proceed' in instances of uncertainty. By using the term 'Precautionary Approach' and redefining it as exercising 'caution', ERMA effectively has jettisoned the Precautionary Principle while appearing to uphold it. This discomfort with the Precautionary Principle is reflective of a kind of technological optimism that may fit the core principles of EM, but fails to measure up to the requirements of sustainable development.

Fischer (1990) suggests that risk management uses the cloak of a seemingly apolitical and non-partisan approach to manage more radical environmentalist worldviews out of the debate. To evaluate this claim we next examine how the ERMA Methodology manages the requirements under the Act to include more diverse worldviews and rationalities as envisioned by sustainable development.

Managing Public Participation

The legitimization of environmental decision making has increasingly required that the public(s) who are potentially affected by, and who live with, the uncertainty of the risks of the proposed activities of new technologies (such as GMOs) have a role in the decision making process. The incorporation of this view can be seen in that the HSNO Act and, in turn, the Methodology were required to make provisions for both Maori (HSNO Act Part II 6 (d) & II 8) and 'public' involvement in the decision making process (HSNO Act V 54 (1); V 60, 61). The inclusion of a plurality of worldviews has become acceptable because

there is less likely to be antagonisms and distrust, and the ensuing decisions are more likely to be legitimated (Lidskog, 2000; Wynne, 2000; Parliamentary Commissioner for the Environment, 2001).

Yet, how much or how little the public will be involved in decision-making still rests on the hegemony of institutional rules and regulations, and how they are translated into institutional practice. For instance, the public's inclusion can span a spectrum from little or no public control (a traditional, pre-EM approach), to consultation (an EM approach), to the public having an active role and the final say in the decision-making (an aspect of sustainable development). In other words, a technocratic, pre-EM view would result in decisions being made by experts on behalf of the public; an ecological modernization approach could introduce processes such as consultation as a mechanism for public inclusion, but still rely on experts to mediate these decisions; and a sustainable development perspective would necessitate public involvement from the outset. The 'management' of public participation that happens under processes driven by either a technocratic or an EM perspective is similar to what Munshi (2005) describes as 'managing diversity', an elite-driven process of retaining control over marginalized individuals and groups. To what extent this is true for ERMA whereby Maori and other public(s) are integrated into its decision-making process is examined below.

Maori Involvement in ERMA's Decision-making Process

Under the title 'Considering Maori Perspectives', the ERMA methodology operationalizes distinct 'pathways' for the Maori worldview to be 'taken account of' in ERMA decision-making process (ERMA, 1998, p. 7). The first pathway was the establishment within ERMA of an advisory board known as Nga Kaihautu Tikanga Taiao (NKTT) to advise the Authority on the principles of the Treaty of Waitangi and the adverse effects and risks of concern to Maori, and to develop appropriate consultative mechanisms and protocol guidelines (ERMA, 1998, p. 15).

The second is the requirement that an applicant consult Maori generally, and also consult directly local *iwi* (tribe) or *hapu* (sub-tribe), who as *Tangata Whenua* (indigenous people), have *kaitiaki* (guardianship) status over the land where an experiment may be carried out. A third way is that Maori as members of the public can present submissions through the public submission process; and, fourth, in light of Maori concerns that

Institutional Bioethics Committees (IBECs) were deciding non-notified experiments without any input from Maori, they are now also represented on these committees (ERMA, 1999a; ERMA, 1999b).

However, Maori activist Moana Jackson (2001, p. 4) contends that the establishment of NKTT shows 'a signal failure because a Treaty relationship is surely more than one party simply being able to advise another'. He states:

> Because Maori considerations are reduced to cultural phenomena the efficacy of the Maori intellectual tradition is itself denied. In its place Maori are asked to offer a mere perspective which easily leads to rejection on the grounds of unreasoned spirituality or minimalization, as something that may be noted but ignored if more compelling scientific or economic reasons can be discovered. This allows the 'Authority' to argue that Maori are only a community of interest rather than a sovereign treaty party (ibid.).

This reductive nature of ERMA is evident also in the following clause, which only requires the Authority to 'consider' the Maori worldview; a stronger requirement, in contrast, would be for the Authority to 'give effect' to it:

> Where evidence relating to an application refers to other values and matters … including the relationship of Maori culture and traditions with their ancestral lands and taonga, the Authority must also *consider* the values and other matters in that evidence (ERMA, 1998, Clause 2, emphasis added).

Local *iwi* who have been consulted are similarly marginalized in that the consultation process can be limited to a discussion on ways of ameliorating biophysical risks of an experiment, which leaves the more complex cultural objections as not needing to be legally addressed during the consultation process. This is of little concern from an EM perspective, but fails sustainable development's requirement of addressing ethical, social and cultural issues appropriately.

<u>Public Involvement in ERMA's Decision-making Process</u>

Members of the public are invited to make written submissions to publicly notified applications, and can call for and participate in public hearings. However, because ERMA has decided to operate under a limited influence role (where the external views are taken into account, but the final decision is made by the Authority), the public's role is to provide information in their submissions and the public hearing, which the ERMA Authority can choose to include or discard when making a decision on an application (Morgan and Archibald, 2000). The ERMA Methodology (1998) suggests that the 'Applicant' should consult with stakeholders and interested parties. This, however, is a suggestion, not a requirement. In the case of non-notified applications, there is no requirement at all to have any input from the public, which means that public scrutiny is excluded. For example, under Part V of the Act, ERMA is required to 'provide for', and the applicant to 'assess', the potential or probable adverse effects on the environment, people and communities (including their social and cultural well-being). A close reading of the Act reveals ERMA's assumption that, firstly, public concerns and values can be identified and accommodated through the information provided in submissions and attendance at hearings. Secondly, it assumes that the information deemed most valid is that with a scientific basis, because 'The Authority *must take account* of the scientific basis or authority for the information contained in the submission' (ERMA, 1998, p. 16, emphasis added). Finally, the main effect that ERMA is asked to consider are the consequences of GMOs escaping into the environment, which fails to assess other effects on people and communities as implied by Section 4 and the definition of 'environment' (Morgan and Archibald, 2000, p. 17).

The reinforcement of a narrow technocratic worldview by ERMA is evident in how it addresses moral, ethical, and cultural issues raised by the public:

> Concerns from [a moral, ethical, or cultural point of view] do not fit comfortably in the existing main effects-based process, and at this stage there is limited information available in New Zealand to provide a basis for making judgments on the moral, ethical and cultural aspects of particular types of applications to ERMA…. Presently there is no evident theoretical basis for tackling this problem…. In the absence of empirical data, *the alternative is to rely on the informed judgment of the decision-makers. Effectively this can be considered as a*

> *sample of the views of the wider population* (ERMA, 2002a, p. 19, emphasis added).

This quote makes clear that only scientifically driven concerns such as the scientific risks of an application will be considered**.** Anything else would be left to the discretion of decision-makers who are seen as reflecting an appropriate sample of the population. This view, which underpins a notion of representative democracy (a characteristic of ecological modernization), entirely ignores the reality that decision makers constitute the political elite of the country. The elitist, narrowly focused nature of political decision-making is unlikely to meaningfully articulate the views of the many marginalized groups in New Zealand. Yet, for ERMA, this is a viable and legitimate approach. Representative democracy is adequate for EM to take place, but sustainable development requires some form of strong democracy with active public participation.

Conclusion

This article has demonstrated that the discourses and discursive practices of ERMA Methodology are heavily oriented towards a narrow definition of EM (Milanez and Bührs, 2007), while marginalizing any active recognition of the goal of sustainability. The construction of the ERMA Methodology within EM's risk/benefit framework suggests that it will maintain an ideological approach to GMOs that has a positivistic bias, and will support those views reflecting strong scientific and economic discourses, while simultaneously rejecting views that encompass issues of cultural and social values, ethics, power, inequality and inequity. As Wales and Mythen (2002, p. 130) have argued, discourses around GM are constructed by two key technologies of government, namely, the 'totalizing discourse of science and the privatization of risk'. The scientization of politics, evident in the privileging of scientific expert discourse in political decision-making, serves to marginalize and invisibilize alternative perspectives and understandings of what constitutes 'nature' and 'risk', weakening the possibilities for ecological sustainability. This is further maintained and supported by the choice to take a limited, specifically defined precautionary approach, rather than invoke the precautionary principle.

Where public participation is concerned, the ERMA Methodology provides unenforceable, mild directives such as 'take account of', 'take into account', and 'consider' the views of the public. Consequently, even as participation is included, it is marginalized. With regard to both Maori and public participation, the narrow scientific risk framework established within the Methodology for decision-making appears unable to acknowledge the fallibility of GM technology, a key requirement of sustainability (Orsato and Clegg, 2005). Such a framework offers no avenues for dealing with the concerns of those groups who may see the use of GMOs as fraught with ecological risk or as involving an ethical and moral question of right and wrong—and not of scientific risks, costs and benefits. The ERMA Methodology clearly is contradictory in that while rhetorically implying that diverse perspectives are to be included, in practice the hegemony of the technocratic values of EM makes it impossible to do so.

Indeed, in examining how participation mechanisms are operationalised in the Methodology, we see an institutional process at work that succeeded in translating broad, ecologically-sensitive goals embedded in the HSNO Act (demonstrative of some notion of both EM and sustainable development) into technical rules of practice that erased ecological sustainability and replaced it with economic and narrowly scientific criteria which are adequate for EM. What explains this seeming sleight of hand? At least a part of the explanation for this lies in the larger socio-political policy context which frames ERMA's functioning. The New Zealand government's vision for economic growth is encapsulated in its 'Growth and Innovation Framework', which outlines two parallel goals of innovation and sustainability (Office of the Prime Minister, 2002). The 'Innovation Goals' centre on three main areas: Biotechnology, ICTs, and Creative Industries. The focus on reconciling economic growth and environmental sustainability is reiterated in its 'biotechnology strategy document', but with a clear emphasis on the priority of economic growth (MORST, 2003). Given this context, bureaucrats exercise considerable political judgement in their careful navigation between keeping environmentalists happy with the rhetoric of sustainable development while satisfying the primary government agenda of economic growth. In practice this has meant adhering to a notion of EM, which may facilitate technological developments such as GM, but demonstrates little concern for the long term goal of sustainable development. ERMA's decision to approve controversial GM experiments and the government's decision to lift

the moratorium on field testing of GM crops, referred to at the beginning of this paper, are both within the framework of what is required for EM, but fail to reveal any real commitment to ecological sustainability.[5]

This analysis of discourses of EM and sustainable development embedded in the biotechnology policy regulatory framework in New Zealand demonstrates how EM, supportive of the economic growth agenda of the state, can work to preempt real commitment to ecological sustainability. Through the use of notions of 'objective science', governance processes can potentially marginalize alternative perspectives offered by the public, and seek to ensure the technoscientific management of politically contentious environmental issues. To the extent that the institutional and regulatory frameworks for decision-making on GMOs in New Zealand, as perhaps elsewhere in First World states, default to a narrowly delineated EM worldview, they fail to meet the challenge of sustainable development. This failure to embrace a more reflexive policy process in line with sustainable development reveals the potential for the cooptation of EM discourses to serve technocratic ends. Unless policies and decision-making processes around genetic modification open up the complex underlying power dynamics to public scrutiny, debate, and control over decision-making, the likelihood of achieving sustainable development appears remote.

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[5] It is noteworthy that the contradictions between goals and practice have been the focus of a fierce public campaign that fought—through written submissions, participation in public hearings, public rallies, and so on—to get ERMA to acknowledge the ecological values embedded in legislation (Kurian and Wright, 2006).

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Table 1 Key Elements of the Discourses of Ecological Modernization and Sustainable Development

Key Elements of the Discourse	Ecological Modernisation	Sustainable Development
Normative Values	• Assumption that economic and environmental benefits can be simultaneously generated • Acknowledgement of interdependence of economy and ecology • Weak 'Precautionary Principle' accepted • Unlimited economic growth through technological innovation • Economisation of the environment • Equity and justice not a primary consideration • Anticipatory environmental policy making	• Assumption that economic and environmental benefits can be simultaneously generated • Acknowledgement of interdependence of economy and ecology • Strong 'Precautionary Principle' required • Economic growth constrained by imperatives of technologies and wise use of resources to meet present and future needs • Intergenerational & intra-generational equity, distributive justice and environmental protection are fundamental to sustainable development • Anticipatory environmental policy making
Democratic process	• Representative democracy • Weak participatory processes	• Discursive democracy • Strong participation through global/local civil society networks
Institutional approach	• Environmental management • Process focused	• Adaptive and integrated environmental management that addresses social, environmental and economic aspects of development. • Process and outcome are both critical for sustainable development
Implementation mechanisms	• Transparent regulation that outlines responsibilities and rules • Voluntary, cooperative approach between government and industry to find industry solutions • National/domestic level of policymaking	• Co-operative rather than competitive • Policy and action enacted at international, national, and local levels
Approach to risk	• Environmental risks as apolitical technical problems • Cost-benefit analysis • Expert-driven • Dominance of technological expertise	• Environmental risks as a political and ideological issue requiring social, cultural, ethical values to be considered • Expert risk assessment balanced with community risk perception • Multiple perspectives and local knowledges acknowledged as important