electoral fraud. They conclude that the merits of the Australian democratic structure had been tempered by the overt influence of major parties, in that the characteristics of the main players in the system (professional males from the majority culture) have barely changed over time. The key to improving the democratic structure lies in encouraging internal diversity within the parties (for which Jupp and Sawer give credit to the minor parties) and to more stringent control over party access to finance.

A book of limited length will inevitably leave out some events and issues. In the last quarter century, a number of events of relevance to the notions of fairness in the electoral system have occurred. These include a tied vote (Nunawading in the Victorian Upper House), changes to the constitutional provisions for the replacement of Senators, an election characterised by a high informal vote (1984 Federal election) and the introduction in nearby New Zealand of a mixed member proportional system. Of particular interest to some is the ability of parties to form government without even receiving more than 50% of the two-party preferred vote (1998 Federal election).

Some discussion of these in the relevant chapters would have added to the book's pertinence. Already in 2002 the issues of the powers and voting system of the Senate, and the length of parliamentary terms, have arisen. Others, such as compulsory voting, do so from time to time. For those seeking to put such issues into context, this volume would provide a more than useful primer.

Reviewed by Peter Taft

The Precautionary Principle: A Critical Appraisal of Environmental Risk Assessment

By Indur M. Goklany
Washington, DC: Cato Institute, 2001, 119 pp, $US 17.95
ISBN 1 930 86516 3

THE precautionary principle has become an established component of international environmental forums and the spirit of the principle is increasingly evident in national environmental policymaking and judicial decisions. It has enjoyed great success among environmentalists and bureaucrats, who revel in its wide-ranging interpretations which can be selectively applied to suit almost any situation.

The basis of the precautionary principle is the fundamental idea of inter-generational equity—that the need to conserve biodiversity should be the basic constraint on all activity so as to ensure that the current generation can leave a no-less impoverished environment to future generations

A widely-used and popular definition of the precautionary principle can be found in the Wingspread Declaration:

> When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not established scientifically. In this context, the proponent of the activity, rather than the public, should bear the burden of proof.[1]

The argument appears compelling. The basic principle of inter-generational equity is a sound moral principle that few would seek to question. Many people—environmentalists and others—favour the 'absolutist' requirements of the precautionary principle where no consideration for the social or economic costs of an activity is made. Others note that there never can be absolute certainty or safety and that it is irrational to apply the precautionary principle, which also limits technological progress. Such limitations are counterproductive in achieving the ultimate goal of wisely using and protecting our natural resources.

Indur Goklany, however, does not seek to enter the debate regarding the rationality of the precautionary principle but assumes it as a viable means of policymaking. He concerns himself with the application of the principle in solving various public health and environmental dilemmas. As one of America's leading authorities on risk assessment, Goklany applies risk assessment to the specific environmental issues of DDT, genetically modified (GM) crops and global warming. The book's aim is to evaluate and develop policies for the three case studies to ensure that they do not ultimately cause more harm than good.

Goklany identifies six hierarchical criteria to construct a precautionary framework for formulating policies where an action could lead to uncertain benefits and uncertain harms (or costs) to public health and the environment. These criteria are:

1 Threats to human health, especially the threat of death, should take precedence over threats to the environment.
2 More immediate threats should be given priority over threats that could occur later.
3 Threats of harm that have a higher certainty should take precedence over those that are less certain.
4 For threats that are equally certain, more weight should be given to those that have a higher expected cost—which might be measured in expected deaths or lost biodiversity, for instance.
5 If the technology is available to

adapt to the adverse consequences of a policy, the harm can be discounted to that extent.

6 Irreversible or persistent potential harms should be given greater priority over temporary or reversible ones.

As Goklany works through each case study, he applies each criterion to the various sets of public health and environmental consequences of the action under review. Whilst this sounds reasonably straightforward, problems arise due to critical factors not remaining constant, therefore often requiring the application of several criteria simultaneously. Consequently, there are instances where no cut-and-dried answer is readily apparent.

The debate regarding the use of DDT has seen a revival in recent times. In the Spring 2001 issue of *Policy*, Dr Roger Bate's article, 'Malaria and the Anti-DDT Campaign', explored links between reduced use of DDT and increases in the occurrence of malaria. Goklany systematically applies each criterion to evaluate whether a global DDT ban would be consistent with the precautionary principle and whether it would make sound global policy for minimising overall public health and environmental risks. His consequent analysis draws a clear distinction between the use of DDT in the developed and the developing world. His conclusions are that calls for a global ban on DDT are based on selective application of the precautionary principle and that the far more immediate risks of such a ban are ignored. He argues that there is justification for a ban on DDT use in developed countries. Any such ban in the developing world, however, would adversely affect economic development and add to the numbers of malaria deaths. Goklany, like Bate, concludes that indoor spraying within homes at risk of malaria saves untold lives whilst minimising impact on the environment.

After DDT, the controversial issue of genetically modified crops is assessed. Agriculture is perhaps the human activity which has had the single greatest effect on world biodiversity and on human well-being. As the world's population grows, demand for agricultural and forest products will inevitably grow with it. The challenge of providing for this increased demand for food whilst minimising the environmental impact can potentially be addressed through the use of bioengineered crops. A comprehensive array of figures is given to espouse the benefits of bioengineered crop technology. For instance, 'if through the widespread adoption of biotechnology, agricultural productivity increased by half a percent per year, cropland could actually be reduced by 98 million hectares rather than increased by 325 million hectares whilst meeting the food demand for a larger and richer population.'

The obvious public health benefits of crops are the increase in food supplies but not so obvious are the benefits in improving the nutritional quality of such food. Billions of people still suffer from undernourishment, malnutrition and other ailments attributable to insufficient food or poor nutrition. For instance, nutrient enriched crops such as the Swiss-engineered 'golden rice'—rich in betacarotene and iron—could have significant impact in reducing vitamin A and iron-deficiency related deaths prevalent in developing nations.

The interesting point made in the discussion of applying the precautionary principle to GM crops is that those who cite it as a justification of prohibition do not then take responsibility for the concomitant risks of such a ban. The Universal Declaration of Human Rights (1948) recognises the right of everyone to 'an adequate standard of living including food, clothing and housing'. Further to this, the Universal Declaration on the Eradication of Hunger and Malnutrition (1974) specifies that every person 'has the unalienable right to be free from hunger and malnutrition' (p. 56). This basic human right to food and nutrition is cast aside by those who seek only to take credit for potential risks to health or the environment rather than calling for research, development and commercialisation of GM crops with a reasonable amount of caution.

Goklany does not ponder whether global warming is happening, likely to happen or not happening, but instead focuses on the public policy issue of the impact of climate change. The attempted control of greenhouse gas (GHG) emissions via such initiatives as the Kyoto Protocol has great potential to aggravate hunger, reduce public health services, increase mortality and retard economic growth. Forcing the pace of GHG reductions will not guarantee net benefits to public health, or the environment, nor will it have a positive effect on reducing climate change. There is far greater certainty of the negative effects of GHG reductions in lower economic growth and greater poverty, primarily for the poorest and most desperate people of the world.

The book is a further addition to the numerous works Indur Goklany has already produced on the subject. Such a topic often risks being excessively dry and academic but this slender volume is packed with facts and presents a detailed analysis of each issue in a clear and easy to follow fashion. His provocative and incisive critique of the precautionary principle is sure to raise the hackles of many readers but it is a must read for policymakers and environmentalists alike.

Reviewed by Sarah Tyrrell

Endnotes

[1] C. Raffensperger and J. Tickner (eds), *Protecting Public Health and the Environment: Implementing the Precautionary Principle* (Washington, DC: Island Press, 1999).