SCIENTIFIC EVIDENCE AND THE PRECAUTIONARY PRINCIPLE IN INTERNATIONAL COURTS AND TRIBUNALS
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Complex problems of scientific evidence have become increasingly apparent internationally today in cases concerning risks of future harm to individuals or the environment. International legal scientific cases are dealt with in many fora, including in the International Court of Justice, in international arbitral tribunals, in the International Tribunal for the Law of the Sea, and in the dispute resolution panels and the Appellate Body of the World Trade Organisation (WTO). The governing law is public international law - the law that applies between the States of the world rather than within them - a law that is made up increasingly of treaties but also incorporates customary international law and general principles of law common among nations.

Experience with scientific cases in international courts and tribunals resonates with domestic practice. Many of the challenges faced have their parallels within national law. However it has to be recognized at the outset that international courts and tribunals work within different parameters to national courts. The substantive legal rules differ. There is a lower volume of cases, and less experience in the handling of evidence. There are larger benches and sometimes shorter hearings. Except in the WTO, there is no appeal from the decisions of most international courts and tribunals: one and the same body must fulfill the functions of a "[c]ourt of first instance and as a court of last resort."[2] Most

[1] The 2010 Salmon Lecture was delivered on 2 September 2010 in Auckland. For further discussion on the subjects of expert evidence, burden of proof and finality in international scientific disputes readers are encouraged to consult Foster, C. *Science and the Precautionary Principle in International Courts and Tribunals: Evidence, Burden of Proof and Finality* (Cambridge University Press 2011).

[2] Rosenne, S *The Law and Practice of the International Court 1920-2005* (4th Ed.) (2006) p. 1340.

significantly, there is a different relationship in international law between processes of lawmaking and processes for dispute resolution. For domestic courts the prospect that the legislature may make new laws that provide a firmer basis for addressing problematic or unresolved policy issues provides a backstop to the judicial process. In international law, law-making machinery operates only slowly, and in a decentralized and often reactive fashion, most often through negotiation between States. Yet disputes are often highly politicized. All this means that the decisions of international courts and tribunals may be far-reaching.

Central to the discussions that follow is the nature of scientific knowledge itself. The central characteristic of scientific knowledge, expounded by the philosopher of science Karl Popper in *The Logic of Scientific Discovery* in 1959, is that all scientific assertions are subject to the possibility of being discarded should they be proven false.[3] Further, science takes place within social matrices. As Thomas Kuhn observed so powerfully in *The Structure of Scientific Resolutions* in 1962, different frames of reference may succeed one another, triggered by fundamental breakthroughs once society is prepared to allow new views to prevail. The classic example is the time that it took for acceptance of the possibility that the world was round and not flat.[4] Thus, scientific knowledge is subject to ongoing challenge and may be superceded through subsequent scientific work, in conjunction with changes and developments in social perspectives.

The level of technicality in international scientific cases is very high, yet, consistent with the nature of scientific knowledge, there remain differences of view among scientists as to the likelihood of future harm. Differences in views among scientists may be due to many factors, including the way samples are selected, variables are chosen, methods of measurement employed, or to the models adopted and the casual inferences drawn.[5] It may well be that further research is needed in order to develop a fuller scientific picture of the situation.

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[3] Popper, K. *The Logic of Scientific Discovery* (4th Ed.) (1959). See also Popper, K. *The Myth of the Framework: in Defence of Science and Rationality* (Routledge, 1994).

[4] Kuhn, T. *The Structure of Scientific Revolutions* (3rd Ed.) (1996).

[5] Fraiberg, J. D. and Trebilcock, M. J. "Risk Regulation: Technocratic and Democratic Tools for Regulatory Reform" [1998] 43 *McGill Law Journal* 835-887; Hickey, J. E. Jr and Walker, V. R. "Refining the Precautionary Principle in International Environmental Law" [1995] 14 *Virginia*

To take an example, the New Zealand case against France in 1995 in the International Court of Justice in relation to underground nuclear testing may be considered.[6] In addition to expressing serious concern about the integrity of the atolls where underground French nuclear testing was taking place, New Zealand argued that scientific studies showed a likelihood of both short and long term radioactive leakage via groundwater. New Zealand asserted that all the independent scientific missions that had visited Mururoa agreed that long term leakage from the atoll would occur.[7] M Tazieff, a French scientist independent of the French government, had advised that a systematic study conducted over a number of years was necessary to assess the mobility of radionuclides in groundwater; while the Atkinson report, presenting the research done by a New Zealand scientific team, observed that mechanisms did exist for the transfer of the contaminated water into the biosphere and that much depended on the depth of placement of the French explosive devices, which was unknown. An investigation by scientific and film teams led by Jacques-Yves Cousteau in 1987 estimated that leakage could occur within 100-300 years. Cousteau's team had carried out underwater filming that revealed fissures and collapses of the rock in the outer part of the atoll. In addition, New Zealand referred to work done under the auspices of the European Commission in 1995, in which it was observed that access to detailed data about the geological structure and movement within the atoll was necessary in order to reach conclusions in relation to a possible long term leakage of radioactivity as well as in relation to the potential for a sudden rupturing of the atoll. [8]

The French position remained that the radioactive impact of testing was infinitesimal and that, even after the prior atmospheric tests, local radiation levels were still below those in European locations where there had been no testing. Measured in micrograys, the level at Mururoa was 262; while in the Netherlands, for example, it was 280; and in New

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Environmental Law Journal Spring, 423 - 454, 408.

[6] *Request for an Examination of the Situation in Accordance with Paragraph 63 of the Court's Judgment of 20 December 1974 in the Nuclear Tests (New Zealand v. France) Case*, Judgment of 22 September 1995 ICJ Reports 1995 p.288.

[7] *Request for an Examination of the Situation,* Application Instituting Proceedings, 21 August 1995 paras 36-40.

[8] *Request for an Examination of the Situation,* Argument by Mr Elihu Lauterpacht for New Zealand, Verbatim Record, Monday 11 September 1995, pp. 64-65, paras 55-56.

Zealand it was 900. France considered it would be rash to deduce that radionuclides within the atoll would inevitably rise to the surface with the movement of groundwater in the atoll. France cited in support the comments of Professor MacEwan, a New Zealand scientist.[9]

In the event, the outcome of New Zealand's attempt to litigate underground nuclear testing was a rejection of the case by the International Court of Justice. The only potential ground for the Court's jurisdiction was a reopening of New Zealand's earlier 1974 case against France, but this case had been directed to bringing an end to **atmospheric** testing, and so could not be reopened. Jurisdiction in the 1974 case had rested on France being party to the 1928 General Act for the Pacific Settlement of Disputes, but France had withdrawn from this treaty shortly after the 1974 proceedings. There was thus no basis for finding that France had consented to the Court's exercise of jurisdiction in the 1995 proceedings concerning **underground** nuclear testing. However, the scientific evidence from the case nonetheless illustrates how reputable scientists may disagree on crucial issues.

The contingent character of scientific knowledge makes for an awkward marriage with the discipline of law. The rationalist adjudicatory tradition, dating back to the Enlightenment, incorporates the aspiration that judicial decisions be based on true and proven facts. As explained by Jeremy Bentham in "The Principles of Judicial Procedure" in 1802 "rectitude of decision" is achieved through the "correct application of valid law to true facts".[10] In this conception a primary aim of procedural law is to facilitate the determination of the facts. But what, then, should be the aims and content of the procedural law relating to proof in scientific cases where there may be insufficient evidence for making a comfortable decision?

We may consider this problem first in relation to the rules on expert testimony; then in relation to rules relating to the allocation of the burden of proof. Lastly we may examine the rules governing the finality

[9] *Request for an Examination of the Situation,* Opening argument by Mr Marc Perrin de Brichambaut of France, Verbatim Record, Tuesday 12 September 1995, 10 am, pp. 44-49, translated in Watts, Sir Arthur *New Zealand at the International Court*, pp. 198-200.

[10] Bentham, J. *Rationale of Judicial Evidence: Specially applied to English Practice: from the Manuscripts of Jeremy Bentham* (1827); Twining, W. *Rethinking Evidence: Exploratory Essays* (2nd Ed.) (2006) p. 41.

of the adjudicatory decision-making process. Do the rules governing the revision of judgments and awards or the doctrine of nullity cater adequately for situations where significant new scientific evidence comes to light after a judgment or award has been handed down? How can an international court or tribunal "future-proof" its decision?

In addressing these three areas of expert evidence, burden of proof and finality, it is clearly important to consider how the precautionary principle can be appropriately accommodated. The principle is widely recognized internationally today, both in national and international law. Global acceptance of the precautionary principle was seen in Principle 15 of the Rio Declaration, adopted at the Earth Summit in Rio de Janeiro in 1992. Principle 15 states that:

> "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."[11]

The precautionary principle has not yet achieved the status of a generally applicable rule of customary international law,[12] nor is it yet recognized

[11] *Declaration of the UN Conference on Environment and Development*, adopted by the UN Conference on Environment and Development at Rio de Janeiro, 14 June 1992, UN Doc A/ CONF.48/14, 11 ILM 1416.

[12] Note that some commentators take the contrary view, that there is a 'good argument' that the precautionary principle has 'emerged as' or 'reflects' a principle of customary international law. Freestone, D. "Caution or Precaution: 'A Rose By Any Other Name'?" [1999] 10 *Yearbook of International Environmental Law*, 25 – 32, at 137. See also Sands, P. *Principles of International Environmental Law*, 2nd ed. (2003), p. 279; Cameron, J.and Abouchar, J. "The Status of the Precautionary Principle in International Law" in Freestone, D. and Hey, E. (eds.) *The Precautionary Principle and International Law: The Challenge of Implementation* (1996) p. 29, at 30. Hey took the view in 1992 'that the concept has at least approached the status of a rule of customary international law, and that the support expressed by states for documents containing the concept is not without legal significance' although 'the precise content and implications of the development remained unclear and elusive.' Hey, E. "The Precautionary Concept in Environmental Policy and Law: Institutionalizing Caution" [1991-1992] 4 *Georgetown International Environmental Law Review* 303- 318**,** 307. See also Gündling, L. "The Status in International Law of the Principle of Precautionary Action" [1990] 5 *International Journal of Estuarine and Coastal Law* 23-30, at 25.

as a general principle of law.[13] However a number of treaties do employ the principle in various ways. To take two examples, the Montreal Protocol on the Protection of the Ozone Layer of 1982 gives effect to the principle;[14] and States party to the UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks 1995 are required to be cautious in their conservation measures where information is uncertain.[15] Further, the logic of precaution is compelling. The principle has an important impact within the negotiation of new international legal instruments; and counsel and judges alike have shown an awareness of its importance during the litigation of disputes.

How are we to accommodate the precautionary principle in procedures for the taking of expert evidence, the allocation of the burden of proof and maintaining the finality of adjudicatory decision-making? First, so far as the taking of expert evidence is concerned, we should encourage international courts and tribunals to continue to develop a more proactive engagement with experts by using an increasing array of techniques facilitating dialogue between adjudicators and experts in most international scientific disputes. An international court must ensure it is in a position fully to appreciate all dimensions of the mixed questions of fact and law that frequently characterise scientific disputes, and to take into account the extent to which precaution is warranted. Second, by virtue of international courts' and tribunals' inherent powers there is

[13] Uncertainties about the application of the principle may detract from its potential to become a "general principle of law" in the sense of Article 38(1)(c) of the Statute of the International Court of Justice. Freestone, 'Caution or Precaution', 136. However see Cameron, J. "The Precautionary Principle: Core Meaning, Constitutional Framework and Procedures for Implementation" in Harding, R. and Fisher, E. (eds.) *Perspectives on the Precautionary Principle* (1999) p. 29. Indeed, Cameron and Abouchar consider the precautionary principle 'a kind of constitutional principle for international society', 23-25, asserting it involves a duty which 'is owed to international society as a whole.' Cameron, J. and Abouchar, J. "The Precautionary Principle: A Fundamental Principle of Law and Policy for the Protection of the Global Environment" [1991] 14 *Boston College International and Comparative Law Review*, 1 – 28, at 22. Cameron, J. 'The Precautionary Principle in International Law' in O'Riordan, T., Cameron, J. and Jordan, A. (eds.) *Re-Interpreting the Precautionary Principle* (2001) p. 113, at 113.

[14] *Montreal Protocol Protocol on Substances that Deplete the Ozone Layer*, 16 September 1987, in force 1 January 1989, 26 ILM 1550, preamble and Article 6(2).

[15] *United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks*, 4 December 1995, in force 11 December 2001, 34 ILM 1542, Article 6. See also the *Stockholm Convention on Persistent Organic Pollutants*, Stockholm, 22 May 2001, in force 17 May 2004, 40 ILM 532, Article 4, and also Article 8(7)(a) and (e) on the listing of chemicals in Annexes A, B or C to the Convention.

scope in an appropriate case for a reversal of the adjudicatory burden of proof to accommodate the precautionary principle. By the "adjudicatory" burden of proof is meant the burden of proof carried by a party in an adjudicatory setting. This contrasts with what can be called the "administrative" burden of proof carried by a party in an administrative process such as a consent application. In international law the two types of burden will not necessarily run together. Third, in relation to the problem of finality, provision should be made for the reassessment of a judgment or award in exceptional circumstances in order to take into account subsequent scientific developments.

EXPERT EVIDENCE

In April 2010 members of the International Court of Justice gave lively consideration to the question of how best to take expert evidence in a scientific case in the *Case concerning Pulp Mills on the River Uruguay*.[16] This was a dispute concerning the legality of the construction of a pulp mill in Uruguay upstream of the border with Argentina. Originally two pulp mills were of concern but the location of one was shifted. Argentina complained of the likely environmental effects from the pulp mill, for example on species such as the Sabaló fish, clams and rotifers, as well as effects on tourism. The Court relied in this case on the scientific evidence presented by the parties. However five of the 15 judges considered the Court should have appointed its own experts.[17] In their Joint Dissenting Opinion, Judges Simma and Al-Khasawneh expressed the view that the Court had missed a "golden opportunity" to deal with the case in a "state-of-the-art" manner and lamented that the Court had:

> 'omitted to resort to the possibilities provided by its Statute and thus simply has not done what would have been necessary in order to arrive at a basis for the application of the law to the facts as scientifically certain as is possible in a judicial proceeding.'[18]

[16] *Case concerning Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, Judgment of 20 April 2010, ICJ Reports 2010.

[17] *Case Concerning Pulp Mills,* Joint Dissenting Opinion of Judges Al-Khasawneh and Judge Simma, Declaration of Judge Yusuf, Separate Opinion of Judge Cançado Trindade, Dissenting Opinion of Judge ad hoc Vinuesa. Judge Cançado Trindade of Brazil also lamented that a site-visit had not been considered.

[18] *Case concerning Pulp Mills*, Joint Dissenting Opinion of Judges Al-Khasawneh and Simma, para 28.

Judge Sir Kenneth Keith explained in a Separate Opinion his own support for the majority view that such investigations were not necessary in the circumstances of the case. Judge Keith explained that the Court saw the task in this case as 'assessing, by reference to the raw data, the impact of the operation of the plant on the water quality'.[19] He commended the parties for enabling the Court to carry out its task more easily by taking the initiative to provide the most recent scientific and technical data covering the period since the mill had come into operation.[20]

The Court addressed whether effluent discharges were within the regulatory limits, and the impact of the discharges on water quality and biodiversity, including with respect to the effects of dissolved oxygen, phosphorus, phenolic substances, nonylphenols, and dioxins and furans. The Court found that Uruguay had breached its procedural obligations under the Statute of the River Uruguay; but that Uruguay had not breached its substantive obligations under the Statute.[21] Uruguay had failed to give appropriate prior notification to Argentina through the Executive Commission for the River Uruguay, but was not found to have breached, for example, the obligation under the Statute to 'protect and preserve the aquatic environment and, in particular, to prevent its pollution'.

The Court presently has two further scientific cases on its docket. First, there is the case of *Whaling in the Antarctic*, initiated by Australia against Japan in 2010 to challenge the legality of Japan's 'scientific whaling programme' in Antarctic waters.[22] Secondly Ecuador has submitted an application in relation to aerial spraying by Colombia of herbicides at its border with Ecuador, as part of Colombia's coca eradication programme. Ecuador has reported serious adverse health reactions as well as negative effects on crops and biodiversity.[23]

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[19] *Case Concerning Pulp Mills,* Separate Opinion of Judge Keith, para 8. See also Separate Opinion of Judge Greenwood, para 24.
[20] *Case Concerning Pulp Mills,* Separate Opinion of Judge Keith, para 3.
[21] Ibid, para 282.
[22] *Whaling in the Antarctic (Australia v. Japan),* Application Instituting Proceedings, 31 May 2010.
[23] *Aerial Herbicide Spraying (Ecuador v. Colombia),* Application Instituting Proceedings, 31 March 2008.

Whether New Zealand will apply to intervene in the *Whaling* case is an open question at the time of writing. New Zealand would have standing to do so under Article 62 or 63 of the Court's Statute. The first hurdle for Australia in the *Whaling* case will be jurisdictional. Australia and Japan have both made a general acceptance of the Court's jurisdiction by virtue of declarations made under Article 36 of the Court's Statute, but Australia's declaration includes a reservation in relation to **disputed** maritime zones including the exclusive economic zone (EEZ). The status of the waters off Antarctica is **unsettled** as a matter of international law, including the waters of the EEZ that Australia has declared off the Australian Antarctic Territory. Indeed, there is no general recognition of States' claims to Antarctic land territory. However whether the unsettled status of the potential maritime zones in Antarctic waters amounts to the same thing as their being "disputed" is an open question. Assuming the Court's jurisdiction is established and the proceedings go forward, a central issue at the merits stage will be whether Japan's whaling programme can indeed be considered a "scientific" programme as permitted under Article VIII of the International Convention for the Regulation of Whaling of 1946, given factors such as the scale of the programme.[24] Scientific evidence will be vital in making this determination.

Returning to the comments of Judges Simma and Al-Khasawneh in *Pulp Mills*, what can be considered the 'state of the art' in the taking of expert evidence in international courts and tribunals? In part, the judges were contemplating some of the advantages of the process that has been used by successive dispute settlement panels in the WTO. In the WTO, the practice has been for panels to appoint a raft of about six independent internationally qualified experts and then to consult them individually through a detailed written procedure. This is followed by a joint meeting with the parties, taking place between the parties' first and second rounds of oral submissions. At the joint meeting the experts respond to questions from the parties and to a lesser extent from the panel. This semi-formal atmosphere has been valuable for allowing the boundaries of the evidence to be tested, and for the panel to develop further its

[24] *International Convention for the Regulation of Whaling*, 161 UNTS 72, Washington, 2 December 1946, entered into force 10 November 1948.

understanding of a case and to try and assess how the factual evidence should feed into the legal findings. This procedure was used for example in the *EC-Biotech* case.[25] In this case the US, Canada and Argentina successfully challenged the European Communities' de facto moratorium on the importation of biotech products, i.e. products such as grains produced using genetic modification techniques.

The WTO process for the consultation of experts has much in common with witness-conferencing procedures, used in disputes under international law so far only in international investment treaty arbitrations. The major difference between WTO procedures and witness-conferencing is that in the WTO the experts are appointed by the panel: they are not party-witnesses. However, one might ask, would it not be most efficient to direct the experts to meet together and if possible to settle any differences between them before, or even after, the more legal stage of the proceedings?

One of the main reasons why this is unlikely to be a sufficient approach is that the legal rules that international courts and tribunals have to apply in determining the legality of a State's conduct frequently involve closely mixed questions of fact and law. The closeness between fact and law is significant in a number of ways for the design of the procedural rules in scientific disputes, and can be illustrated with a reference to many of the cases that have arisen. The *EC-Asbestos* case can be considered.[26] In this case an EC ban on white asbestos from Quebec was upheld by the WTO Appellate Body. The expert evidence taken by the panel went closely to the determination of whether or not the EC measures could be considered "necessary" to protect human life or health under Article XX(b) of the GATT.[27] This included assessing whether there were any

[25] *European Communities - Measures Affecting the Approval and Marketing of Biotech Products*, Complaint by United States, Canada, Argentina (WT/DS291, WT/DS292, WT/DS293), Report of the Panel DSR 2006:III, 847, para 7.1.

[26] *European Communities - Measures Affecting Asbestos and Asbestos-Containing Products*, Complaint by Canada (WT/DS135), Report of the Panel DSR 2001:VIII, 3305, Report of the Appellate Body DSR 2001:VII, 3243.

[27] Article XX reads:

> "Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where

reasonably available alternatives to the EC asbestos ban. The Panel asked the experts to make comparisons between risks in respect of the French policy of using substitute products in place of asbestos.

To take another example, in its 2010 decision the WTO panel dealing with Australia's import restrictions on New Zealand apples engaged closely with the expert evidence.[28] So far as fire blight was concerned, the panel found that the risk assessment on which Australia's measures was based did not fulfill the requirements of a proper "risk assessment" under the WTO Agreement on Sanitary and Phytosanitary Measures.[29] The problems with the Australian risk assessment included a blanket assumption that fireblight was present in all NZ orchards; erroneous estimation of the likelihood that an apple from even an infected or infested orchard was itself infected or infested; insufficient scientific evidence to show that clean fruit was contaminated during picking and transport or routine packing house procedures; incoherent and unobjective reasoning on the likelihood of entry, establishment and spread of fireblight and of the consequences; and a methodology that overestimated likelihood of events when their true likelihood was negligible. The experts' evidence on the facts went closely to the interpretation and application of the legal requirement for a "risk assessment". The panel's ruling is presently under appeal.

As these cases demonstrate, a key issue arising out of the use of independent expert testimony is the scope this creates for the blurring of roles between experts and adjudicators, as experts become closely involved in the intricacies of legal questions. Allied with this is the question of how experts' individual adherence to the precautionary

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> the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures…
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> (*b*) necessary to protect human, animal or plant life or health; …
> (*g*) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption; …"

[28] *Australia — Measures Affecting the Importation of Apples from New Zealand*, Complaint by New Zealand, DS 367, panel report circulated 9 August 2010.
[29] Agreement on the Application of Sanitary and Phytosanitary Measures, *The Legal Texts: the Results of the Uruguay Round of Multilateral Trade Negotiations* (1999) p. 59.

principle may feed into the legal decision-making process. Experts' support for precautionary approaches may vary, but such support is apparent in most of the cases to date. For example in *EC-Asbestos* the panel-appointed expert Dr. Henderson considered that when a government had to make a decision in a context of scientific uncertainty as to causes and effects, and the potential environmental consequences of action or inaction were generally considered to be serious or irreversible, then the precautionary principle was an important factor.[30] In *EC-Biotech* the panel-appointed expert entymologist Dr. Andow remarked wryly in relation to the particular issue of insecticide resistance that '[f]or each new insecticide product that came out, the entomologists thought that insects couldn't evolve resistance to 'this one' (the new insecticide). By the 1980's, the entomologists gave up on that argument, because every time they said it, they were proved wrong.'[31]

In the end a blurring of roles between experts and adjudicators is to a degree inevitable. However this should not be regarded as removing us altogether from the realm of rationalist adjudication with its presupposition of a distinction between fact and law. The best remedy both for the blurring of roles and for accommodating the commitment of experts to the precautionary principle is to ensure that all the relevant matters are dealt with transparently in the reasoning of international courts and tribunals, and that these bodies themselves articulate their decisions in terms making it clear that they take the responsibility for their own findings. At the end of the day it is the adjudicators sitting on the court or tribunal who are trained in the process of interpreting the law with a view to its soundness in the long term and not merely to a successful and correct resolution of the particular dispute before them, and who are authorized to carry out this role. Transparancy will help to deal at least in part with the problems raised by the blurring of roles. Overall, the advantages of proper, dialogic consultation with experts outweigh the disadvantages.

In addition to evidence from parties' experts, and evidence from its own experts, evidence may also come to an international court or tribunal

[30] *EC-Asbestos* Panel Report, para 5.624.

[31] *EC-Biotech* Panel Report, Annex J, Transcript of the Panel's Joint Meeting with Scientific Experts of 17 and 18 February 2005, Dr. Andow, para 1193. Ch 4, p. 34.

from international organisations such as the United Nations. For example in *Application of the Convention on the Prevention and Punishment of the Crime of Genocide* (*Bosnia and Herzegovina v. Serbia and Montenegro*) the Court took closely into account the United Nations Secretary General's report on the Fall of Srebrenica.[32] Additionally there is scope for the appointment of assessors, or even of technically qualified individuals to ad hoc tribunals. Indeed, counsel themselves may be technically qualified. However in the *Pulp Mills* case, the International Court of Justice made it clear that in future the Court will not wish to see the presentation of technical evidence by scientists appearing before the Court as advocates, because in this capacity they are not subject to cross-examination. The Court said that 'those persons who provide evidence before the Court based on their scientific or technical knowledge and on their personal experience should testify before the Court as experts, witnesses or in some cases in both capacities, rather than counsel, so that they may be submitted to questioning by the other party as well as by the Court'.[33] The matter was addressed further by Judge Greenwood in his separate opinion, underlining that the Court had 'unequivocally indicated' that the practice of presentation of scientific expertise by experts appearing as counsel should not be repeated in future cases.[34] Judge Greenwood noted the vital distinction between evidence and advocacy.[35]

The best outcome will be the resolution of a dispute through resumed bilateral cooperation at the technical level. This was seen in the *Case concerning Land Reclamation*, in which a provisional measures application was brought in 2003 before the International Tribunal for the Law of the Sea, a standing international court of 21 judges established under the United Nations Convention on the Law of the Sea (the LOSC) with its

[32] Report of the United Nations Secretary-General "The Fall of Srebrenica", UN Doc. A/54/549. *Case Concerning the Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosnia and Herzogovina v Serbia and Montenegro),* Judgment of 26 February 2007, ICJ Reports 2007, p.209.

[33] *Case concerning Pulp Mills*, para 167. See also the Joint Dissenting Opinion of Judges Al-Khasawneh and Simma, para 6.

[34] *Case concerning Pulp Mills*, Separate Opinion of Judge Greenwood, para 28.

[35] *Case concerning Pulp Mills*, para 27, citing Watts, A. "Enhancing the Effectiveness of Procedures of International Dispute Settlement" in Frowein, J.A. and Wolfrum, R. (Eds.) *Max Planck Yearbook of United Nations Law*, Vol 5, 2001, pp. 29-30. See also Jolowicz, J.A. *On Civil Procedure*, 235.

seat in Hamburg.[36] Malaysia asserted that the results of reclamation works being carried out by Singapore included changes in the transportation and deposit of sediment by the ocean currents in the vicinity, changes in the salinity of estuary waters and coastal erosion. As well as affecting the environment these changes threatened aquaculture and the interests of local fishermen, navigation and the stability of jetties. On application by Malaysia, the Tribunal made a provisional measures order requiring the parties to enter into consultations to establish promptly a group of independent experts with a mandate to conduct a study over a period of one year to determine the effects of Singapore's land reclamation and to propose measures to deal with any adverse effects.[37] The following year a conference was held at The Hague at the parties' request, at which they presented an overview of the joint study and advised that they had agreed on a draft Settlement Agreement. The Arbitral Tribunal established under the LOSC[38] to hear the merits of the case made an Award on Agreed Terms at the parties' request, including provision for ongoing technical co-operation between the parties.[39] Thus the dispute was brought to an end by the parties as a result of the technical work that had been carried out and without the need for a hearing on the merits.

BURDEN OF PROOF

If the complexities of a scientific dispute cannot be resolved through good fact-finding, should a dispute involving scientific uncertainty be resolved instead through simple recourse to the rules on the allocation of the burden of proof? The traditional rule on the allocation of the burden of proof in international law is that a party asserting a claim or defence must prove the facts necessary to establish that claim or defence: *actori incumbit probatio*. The standard of proof remains unarticulated in international practice, but is generally held by common lawyers to amount to a balance of probabilities or preponderance of the

[36] *United Nations Convention on the Law of the Sea*, Montego Bay, 10 December 1982, in force 16 November 1994, 21 ILM 1261,
[37] *Case Concerning Land Reclamation by Singapore in and around the Straits of Johor (Malaysia v. Singapore), (Provisional Measures)*, Order of 8 October 2003, para 106(1)(a)(i).
[38] See *United Nations Convention on the Law of the Sea*, Annex VII.
[39] *Case Concerning Land Reclamation by Singapore in and around the Straits of Johor (Malaysia v. Singapore)* Award on Agreed Terms, 1 September 2005, XXVII UNRIAA 133.

evidence test, except in case of grave charges against a State in which case a higher standard may apply.[40]

Allocation of the burden of proof may be determinative. In the WTO *EC-Hormones* case in 1998 the panel found against the EC's ban on imports of beef from North American cattle treated with growth promotion hormones partly on the basis that the EC had not discharged the burden of showing it was entitled to maintain a higher level of health protection against imports than the level of protection prevailing under international standards.[41] As it happened, the Appellate Body found that the Panel had incorrectly allocated the burden of proof. The Appellate Body considered that WTO Members had a right to establish higher levels of protection than were found in international standards and that reliance on this right under the WTO Sanitary and Phytosanitary Measures Agreement was not to be considered as reliance on an exception or defence attracting the burden of proof. However the Appellate Body agreed that the EC was in breach of the obligation to base its measure on a risk assessment.[42]

Hungary was less fortunate before the International Court of Justice in the *Case concerning the Gabcikovo-Nagymaros Project*, a joint project under a bilateral treaty concluded in 1977 between Hungary and Czechoslovakia for the construction of a series of locks and dams on the River Danube.[43] Following its transition out of socialism, Hungary pulled out of the project, asserting environmental reasons. Slovakia then unilaterally

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[40] To take an example of the latter, in the *Genocide* case the International Court of Justice took the view that the Court 'had to be fully convinced' that allegations of genocide and other acts had been clearly established. These comments were reminiscent of the Court's comments in the *Corfu Channel* case. In the *Corfu Channel* case the UK argued that it could satisfy the burden of proof by showing with reasonable certainty the complicity of Albania in minelaying in the Channel. The Court said however that 'a charge of such exceptional gravity against a State would require a high degree of certainty that has not been reached here.' *The Corfu Channel Case (United Kingdom v Albania)*; Judgment of 9 April 1949, ICJ Reports 1949 p.2, 17.

[41] *European Communities - Measures Concerning Meat and Meat Products (Hormones)*, Complaint by Canada (WT/DS48), Complaint by the United States (WT/DS26). Two identically constituted WTO dispute settlement Panels (the Panel) circulated parallel reports in this case: Report of the Panel (Canada) DSR 1998:II, 235; Report of the Panel (United States) DSR 1998:III, 699.

[42] *European Communities - Measures Concerning Meat and Meat Products (Hormones)*, Report of the Appellate Body DSR 1998:I, 135.

[43] *Case Concerning the Gabcíkovo-Nagymaros Project (Hungary/Slovakia)*, Judgment of 25 September 1997 ICJ Reports 1997 p.7.

dammed the Danube, leaving only a trickle of water in the old riverbed and causing significant environmental damage. As a justification for its breach of the treaty, Hungary argued that it had faced a situation of ecological necessity. The Court held that, as the science was uncertain, it could not reach the conclusion that the envisaged harm reached the threshold of imminence required under the defence of necessity. Hungary had failed to discharge its burden of proof. The decision has been criticised by various commentators for not being in accordance with the logic of the precautionary principle.[44]

To take a further example, individuals living in French Polynesia who complained about French atmospheric nuclear testing to the UN Human Rights Committee and the European Court on Human Rights in the 1990s had their complaints ruled inadmissible for failure to establish the associated health risks. They, too, lost their cases basically because they could not discharge the burden of proof.[45]

Surely there will be instances where the proper approach is more precautionary? One of the judges in the International Tribunal for the Law of the Sea, Judge Laing, expressed the view that the precautionary principle would be a way to counter forensic or proof difficulties in the *Southern Bluefin Tuna* case in 1999.[46] In this case New Zealand and Australia successfully sought provisional measures against Japan to conserve tuna stocks, although the case did not advance to the merits because the Convention for the Conservation of Southern Bluefin Tuna of 1993 did not envisage compulsory jurisdiction. There were a number of problematic areas of uncertainty in the scientific evidence. To work out whether the parental biomass of southern bluefin tuna was still in decline required an estimate of the age at which the tuna reached maturity and could reproduce. There was also uncertainty about natural mortality rates, susceptibility to catch, and about unreported catches and discarding of fish, as well as uncertainty about environmental factors which might affect the state of the fish stocks. Judge Laing indicated

[44] See, inter alia, Foster, C. "Necessity and Precaution in International Law: Responding to Oblique Forms of Urgency" [2008] 32(2) *New Zealand Universities Law Review* 265 – 283.
[45] *Bordes, Tauira and Temeharo v. France*, 30 July 1996, [1996] UNHRC 28; *Noël Narvii Tauira and Eighteen Others v. France* Application No 28204/95 4 December 1995 3 IELR 774.
[46] *Southern Bluefin Tuna Cases (New Zealand v. Japan; Australia v. Japan) (Provisional Measures),* Order of 27 August 1999, 38 ILM 1624.

that an explicit reversal of the burden of proof on the basis of the precautionary principle would have been a matter for consideration at the merits stage.[47] Arugably, if the *Southern Bluefin Tuna* case had gone to the merits stage, it would have seemed inconsistent with the purposes of adjudication to reject the case on the grounds simply that the claimants had not substantiated their case.

If a precautionary reversal of the burden of proof is to be contemplated, what tests should be applied in order to assess when this might be appropriate? First, bearing in mind the formula in the Rio Declaration referred to above of "lack of full scientific certainty", how much **certainty or uncertainty** must there be about a potential risk? The standard has been described in many ways in international legal commentary. For example, Nicolas de Sadeleer refers to a need for the 'reasonable scientific plausibility' of a risk;[48] Catherine Redgwell, Alan Boyle and Patricia Birnie refer to whether there are 'reasonable grounds for concern';[49] Timothy O'Riordan writes of a 'credible threat'[50] and Australians Elizabeth Fisher and Ronnie Harding of a 'reasonable possibility' of damage.[51] Refining these tests will be a matter for careful consideration by any court or tribunal contemplating a precautionary reversal of the burden of proof.

We must also ask, at what **magnitude** will the envisaged harm constitute the "threat of serious or irreversible" harm envisaged under the precautionary principle? Again, there is little international consensus on this point but it is clear that both these dimensions of a given risk will be taken into account by an international court or tribunal. In the *Southern Bluefin Tuna* case levels of uncertainty were high in relation to the potential for the parental biomass to recover to 1980 levels, and the threat to Southern Bluefin Tuna was serious, in that the potential outcome of continuing unrestrained fishing was a catastrophic collapse

[47] Ibid, Separate Opinion of Judge Laing, para 21.
[48] de Sadeleer, N. *Environmental Principles: From Political Slogans to Legal Rules* (2002) p.160; See also Peel, J. *The Precautionary Principle in Practice: Environmental Decision-Making and Scientific Uncertainty* (), p. 50.
[49] Birnie, P.; Boyle, A. and Redgwell, C. *International Law and the Environment* (3rd Ed.) (2009) p.156.
[50] O'Riordan, T. "The Politics of the Precautionary Principle" in Harding, R. and Fisher, E. (Eds.) *Perspectives on the Precautionary Principle* (1999) p. 283.
[51] Harding, R. and Fisher, E. (Eds.) *Perspectives on the Precautionary Principle* (1999) pp. 2, 14.

of the stock.[52] At the provisional measures stage, the Tribunal was in no doubt that there was cause for serious concern.[53]

There will, however, remain many cases where a reversal of the burden of proof is not called for. The *Mox Plant* case concerned an unsuccessful Irish challenge to the commissioning of a new nuclear reprocessing facility for mixed oxide fuel from Japan at Sellafield power plant in Cumbria, on the Irish Sea.[54] Ireland complained about the production of radioactive waste at the MOX plant in solid, liquid and gaseous form. Ireland was anxious that such wastes would be discharged into the Irish Sea or into the atmosphere. [55] Particular characteristics of MOX fuel were cited, including its automated production, its reliance on powder technology (which is known for reliability concerns), the potential seriousness of lapses in the quality of inspections, and the relatively low temperature at which exposed MOX pellets will give off respirable particles following relatively short exposure periods.[56] Ireland contended that the authorization and operation of the MOX plant would be inconsistent with a number of the United Kingdom's obligations under the LOSC relating to: co-operation to protect the marine environment;[57] environmental impact assessment;[58] and the protection and preservation of the marine

[52] In the 1980s, studies had revealed the parental stock level of the tuna to have been reduced to only 23-30% of its 1960 level. The Scientific Committee established under the 1993 Convention to assist the Commission for the Conservation of Southern Bluefin Tuna later identified the 1980 parental biomass level as the threshold for a biologically safe population. At the time of the proceedings, recent Scientific Committee assessments had found the current size of the spawning stock was still only 25-53% of the 1980 level. The issue was whether the spawning stock or 'parental biomass' of the tuna was still declining, or whether it was on the road to recovery. Estimates of the probability of recovery varied from <14% (Australia's and New Zealand's scientists) to 76-87% (Japan's scientists).

[53] For further discussion, see Foster, C. "The "Real Dispute" in the Southern Bluefin Tuna Case: a Scientific Dispute?" [2001] *International Journal of Marine and Coastal Law* 571 – 601.

[54] *Dispute Concerning the MOX Plant, International Movements of Radioactive Materials and the Protection of the Marine Environment of the Irish Sea (Ireland v. United Kingdom) Request for Provisional Measures*, Order of 3 December 2001, 41 ILM 405. See also the reaffirmation of the Tribunal's measure by the Tribunal constituted under Annex VII of the LOSC to hear the merits of the case, in *Mox Plant case (Ireland v United Kingdom)* (*Suspension of Proceedings on Jurisdiction and Merits and Request for Further Provisional Measures)*, Order of 24 June 2003, 42 ILM 1187.

[55] *MOX Plant (Provisional Measures)*), Written Response of the United Kingdom, Request for Provisional Measures, para 32.

[56] Ibid, para 32.

[57] *United Nations Convention on the Law of the Sea*, Articles 123 and 197.

[58] Ibid, Article 206.

environment from intended, accidental, and unexpected terrorist releases of radioactive materials or wastes from the MOX plant and/or ships traveling to and from the plant.[59] The United Kingdom argued that the expected doses of radioactivity from MOX production were of negligible radiological significance.

In this case the International Tribunal for the Law of the Sea thought it appropriate to record Ireland's argument that it would be consistent with the precautionary principle for the burden of proof to fall on the United Kingdom. At the same time, the Tribunal noted the United Kingdom's contention that it had produced evidence that the risks from the MOX Plant would be very low indeed.[60] The Tribunal's decision to record these two points one after the other hints that, if there were to have been a reversed burden of proof, the United Kingdom could have been considered to have discharged it. In the end the Tribunal considered that there was insufficient evidence to grant the provisional measures requested, though the parties were directed to consult and to exchange information. The case did not reach the merits stage because in the interim the European Court of Justice held that Ireland lacked standing to have brought a case against the United Kingdom under the UN Convention for the Law of the Sea and should instead have used the dispute resolution procedures available to it within the EC.[61]

In a meritworthy case arguably the best tool for reversal of the burden would be the adoption of a *prima facie* case approach. If a party had made out a *prima facie* case in all other relevant respects, but key facts and questions remained subject to scientific uncertainty, then an international court or tribunal should consider whether the thresholds triggering the precautionary principle had been crossed, with a view to reversing the burden of proof in relation to these questions. Arguably, it is within the inherent powers of international courts and tribunals to do so, in the interests of the sound administration of justice; taking into account also that the underlying rationale of the rules on burden of proof incorporates centrally the principle of fairness; and that the

[59] Ibid, Articles 192-4, 207, 211 and 213.
[60] *Mox Plant (Provisional Measures),* paras 71 & 72.
[61] Case C-459/03, *Commission of the European Communities v. Ireland Case* [2006] ECR I-4635.

sources of the rules on burden of proof in international law are multiple and may allow considerable flexibility in the evolution of the rules.

FINALITY OF DECISION-MAKING

For judgments and awards dependent on continually advancing scientific research there is a further awkward problem. Within a relatively short period of time it is possible that new scientific evidence could show a judgment or award to have been based on erroneous factual foundations.

Existing rules for the review of judgments in the light of new facts and awards are insufficient for dealing with complex scientific disputes involving mixed questions of fact and law. For example, the rules regarding revision are designed to deal with relatively simple instances where the discovery of an isolated new fact would clearly be likely to require an amendment to a judicial decision without reargument. The doctrine of nullity is limited, too. Error of fact, let alone error of law, has little acceptance as a ground of nullity, which rests more usually on grounds such as excès de pouvoir, where decision-makers have gone beyond their authority.[62] Further, if a claim for nullity were successful, but the dispute was not automatically resubmitted for adjudication, the result would potentially be to leave the parties' legal dispute unresolved unless fresh proceedings were instituted.

In addition a problem arises that is common to the various existing forms of review. In many cases even a subsequent scientific discovery of considerable magnitude would not be relevant in the context of the legal obligations applying to a dispute, because these obligations are "temporally conditioned". For example, there will be obligations governing the legality of risk-generating activity that are based on the state of scientific knowledge at the time of the original dispute, such as a requirement that the parties should be acting on the basis of the best scientific evidence available.

[62] Reisman W. M. *Nullity and Revision: The Review and Enforcement of International Judgments and Awards* (1971).

By way of illustration, in the *Southern Bluefin Tuna case (Australia and New Zealand v. Japan)* Australia and New Zealand alleged that Japan had breached Article 119(1)(a) of the United Nations Convention for the Law of the Sea which requires parties to take:

> "measures designed **on the best scientific evidence available** to maintain stocks at or restore stocks to a level which can produce the maximum sustainable yield".[63]

Under the existing generic forms of review in general international law, including revision and also nullity proceedings, subsequent scientific discoveries would be irrelevant to the question of compliance with obligations of this type at the time of the original complaint. However, the obligation is a continuing one. If the activity in question is also ongoing, then, arguably, an appropriately designed form of reassessment proceedings should even stretch so far as to incorporate scope for assessment of compliance at the time of those subsequent proceedings. This is what will be needed for a real resolution of the parties' dispute.

On rare occasions, express provision is made by an international court or tribunal for a decision to be revisited, as in the 1974 *Nuclear Tests Cases (Australia v. France) (New Zealand v. France).*[64] In its judgments in these cases the Court added that if the basis of its judgments were to be affected, the applicants could request an examination of the situation.[65] This catered for the possibility that France might resume atmospheric testing. The same device could be used by an international court to "future proof" a judgment against significant scientific developments or new research results. An alternative potential form of device is seen in the *Case concerning the Gabcíkovo-Nagymaros Project (Hungary/Slovakia).* In this case the parties' special agreement, under which the case was brought before the International Court of Justice, provided that, although the parties would accept the Court's judgment as final and binding, either party could return to the Court if necessary for an additional judgment to determine the modalities for executing

[63] *United Nations Convention on the Law of the Sea*, Article 119(1)(a).
[64] *Nuclear Tests case (Australia v. France)*, 20 December 1974, ICJ Reports 1974 p. 253, para 60; *Nuclear Tests case (New Zealand v. France)*, 20 December 1974, ICJ Reports 1974 p. 457, para 63; *Request for an Examination of the Situation*.
[65] *Nuclear Tests case (Australia v. France)*, para 60; *Nuclear Tests case (New Zealand v. France)*, para 63.

its judgment, should negotiations fail.[66] How developments in scientific research might play into these modalities is an open question. We may yet find out. If the Strategic Environmental Assessment that was due to be concluded in December 2009 fails to produce movement forwards, the case may come before the International Court of Justice again.[67]

In the WTO there is general provision for proceedings to determine whether a WTO Member previously found to be out of compliance with its WTO obligations has since come into compliance.[68] Either party can initiate these compliance proceedings, the original complainant or the original respondent. This provision has been used in a number of scientific cases and its use was contemplated also in the *EC-Hormones* dispute. Having lost the original *EC-Hormones* case in 1998 the EC had for some time been taking the position that the science had since developed far enough to justify its import ban. However the EC had not wished to initiate compliance proceedings partly for fear of being allocated the burden of proof on matters in relation to which there was still scientific uncertainty.[69] So instead the EC brought proceedings in 2008 challenging the legality of the Canadian and US countermeasures imposed to retaliate against the EC after it lost the original case. The EC argued in these proceedings that Canada and the US had the burden of proving the legality of their countermeasures and that they therefore had the burden of showing that the EC's import barriers were still inconsistent with WTO law. The Appellate Body found that it would be more appropriate for both parties to initiate compliance proceedings, and clarified that in such proceedings the EC would have to show that it

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[66] See Article 5 (3) of the parties' Special Agreement in *Case Concerning the Gabcíkovo-Nagymaros Project*.

[67] Szabó, M. "The Implementation of the Judgment of the ICJ in the Gabcíkovo-Nagymaros Dispute" [2009] 39 *Environmental Policy and Law* 97-102.

[68] Understanding on Rules and Procedures Governing the Settlement of Disputes *The Legal Texts: the Results of the Uruguay Round of Multilateral Trade Negotiations* (1999), p.354, Article 21.5.

[69] Indeed, in the growth promotion hormones dispute:

> "It [was] widely thought that fear of bearing the full burden of proof in a scientifically complex and politically sensitive dispute – like all those involving public health – [was] the main factor impeding the initiation of substantive compliance proceedings by any party', leading to a long, drawn-out, political battle." EU Takes First Step to Clarify Beef Hormones Science, www.ictsd.net / December 2008 – January 2009 / No. 6 p. 14

had cured the defects identified in the original *EC-Hormones* ruling but any new claims against the EC would have to be proven by the complainants. [70] The dispute has since been settled as between the US and the EC,[71] and is likely to be settled as between the US and Canada.

Thus the WTO now has a blueprint for reassessment of cases involving new developments, both in scientific disputes and in other cases. It might be valuable to envisage a similar, generic form of reassessment proceedings for use in exceptional cases in general international law outside the WTO. This would be additional to the device seen in the *Nuclear Tests* cases where an international court or tribunal includes a specific clause in its judgment or award allowing its revisitation in the light of subsequent scientific developments. Generic provision for reassessment proceedings might be especially helpful for decisions by bodies that become *functus officio* after making their decisions, such as arbitral tribunals under the UN Convention on the Law of the Sea, and arbitration tribunals making decisions under investment treaties.

CONCLUSION

In relation to each of the three topics addressed in this lecture - expert testimony, burden of proof and finality of decision-making - awkward issues are increasingly faced by international courts and tribunals. The search for the most appropriate way to deal with these problems is ongoing. Depending on the circumstances of the case, in the end it is perhaps to one of the older and best known international arbitral awards that we may turn for the best methodology for dealing with disputes involving scientific uncertainty: the *Trail Smelter* dispute. [72] The *Trail Smelter* case dealt with US complaints about the emission of sulphur dioxides from a smelter at Trail in British Colombia. The arbitral

[70] *Canada-Continued Suspension of Obligations in the EC-Hormones Dispute,* Complaint by the EC (WT/DS321) Report of the Panel, Report of the Appellate Body, adopted 14 November 2008; *US-Continued Suspension of Obligations in the EC-Hormones Dispute,* Complaint by the EC (WT/DS320) Report of the Panel, Report of the Appellate Body, adopted 14 November 2008.

[71] *European Communities – Measures Concerning Meat and Meat Products (Hormones) Joint Communication from the European Communities and the United States*, 30 September 2009, WT/DS26/28. See also Bridges Weekly Trade News Digest, 13 May 2009, Vol 13 No. 17, 3.

[72] *Trail Smelter Arbitration (US v. Canada)* 16 April 1938, 11 March 1941, 9 ILR 315. For an overview, Stephens, T.*International Courts and Environmental Protection,* (2009), pp. 125-36.

tribunal in this case issued not one but two separate awards, spaced some two years apart. The tribunal identified from the scientific evidence before it that the real problem was due to the carriage of sulphur dioxide fumes in the upper air currents. Accordingly, in its first award the Tribunal decided that three consultants would be appointed for the gathering of meteorological observations, and prescribed a temporary emissions limitations regime. In its second award the Tribunal was then in a position to lay down a detailed and permanent regime for the operation of the Smelter at Trail. A staged award of this nature may be the very best way of all to deal with scientific uncertainty in international adjudication.