PRECAUTIONARY PRINCIPLE

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DISSEMINATION PAPER - 8

Centre of Excellence in Environmental Economics
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Introduction

Often available scientific evidence provides us cause for concern but does not give conclusive information. In such scenarios risk assessment compels us to strike a balance between the need to protect health and environment on one hand, and the foregone advantages of strict restrictions that may turn out to be unwarranted. It is in this context the role for precautionary principle (PP) emerges. While deciding the need and timing of the application of the PP, it is important to clearly understand the principle and its consequences. This paper addresses the following issues with regard to the PP:

- Concept and definition of the PP
- Decision theory and the PP
- Precautionary principle in practice
- Late lessons from early warnings – the European experience
- Precautionary Principle – India

Precautionary Principle or *Precautionary Approach*

At the outset it may also be useful to clarify the distinction between *Precautionary Principle* and *Precautionary Approach*. Purely from terminology point of view, *Precautionary Approach* appears appropriate given that it implies flexible operational measures that take context specific issues into consideration and allow for trade-off of multiple objectives including environmental and economic objectives. On the other hand, *Precautionary Principle* might give an impression that environmental considerations dominate over all other considerations. From legal perspective, on the other hand, the distinction between *Principle* and *Approach* is more significant. Since the debate on whether precaution has become part of the customary international law is unresolved, the use of phrase *Precautionary Principle* might give incorrect impression that there is a broad obligation to

apply precaution in decision making. Not-withstanding such subtle distinction, this paper uses the two phrases interchangeably.

Two Examples

One of the best ways to understand the significance of the PP is through examples. Here two examples are taken-up for discussion. The first one is concerning dioxin pollution and related health impacts, and the second one is regarding climate change concerns. In both the examples there is a strong case of application of 'precaution', however, in reality the chances of such an approach appear remote.

(Pre)caution with Dioxin

Dioxin is a general term used to describe a group of hundreds of chemicals that are highly persistent in the environment. Dioxin is formed by burning chlorine-based chemical compounds with hydrocarbons. The major sources of dioxin in the environment include waste-burning, paper mills that use chlorine bleaching, production of polyvinyl chlorine (PVC) plastics, and chlorinated chemicals like pesticides.

Dioxin is extremely toxic in laboratory experiments, both acutely and chronically at very low doses and some dioxins are identified as carcinogenic to humans. The time and spatial scale of dioxin contamination is vast. Dioxin has been measured throughout the globe and its persistence, both in humans and the environment, means that future generations will be exposed to dioxin produced today. Harm caused by dioxin to humans and ecosystems is likely to be irreversible, or reversible only over decades. Scientific uncertainty arises because cancer, one impact of dioxin exposure, can take years to manifest itself – and hence it is often impossible to link exposure and disease. Also, there is uncertainty about interaction between dioxins and other persistent organic chemicals and the associated impacts on human beings. Is it possible to eliminate exposure to dioxins? This may not be possible (and also very costly) as even small quantities of dioxin exposure may be harmful.

Since dioxin is mainly generated by anthropogenic activities it should be possible to reduce or eliminate the sources of dioxin. A 'moderate' precautionary approach would involve reducing/eliminating the large sources of dioxin. On the other hand, a 'stronger' precautionary approach would attempt at phasing out chlorine, the ultimate source of dioxin.

Responding to Climate Cha(lle)nge

Rise in atmospheric concentration of greenhouse gases such as carbon dioxide (CO_2) and methane is well documented. Compared to the pre-industrial revolution level of 280 ppm the atmospheric concentration of CO_2 has increased to 379 ppm in 2005 and is likely to rise by 1.5 to 3.0 times over the next century. Based on such projections of concentration of CO_2 and other gases the likely changes in climate are assessed. The global mean temperature is likely to increase by 1.8 to 4^{o}C and global average sea level rise is likely to be 0.18 to 0.59 meters over the century (Solomon *et al.*, 2007). The wide ranges indicate significant scientific uncertainty that is associated with the analysis. The uncertainty could stem from various sources including the greenhouse gas emissions, influence of clouds and aerosols on the atmospheric warming, feedback effects of oceans, and natural climatic variability. Further, the projected changes in climate mentioned above do not include the 'surprises' such as meltdown of glaciers and North Atlantic ice sheet and weakening of heat carrying capacity of Gulf Stream to the Europe. It is virtually impossible to associate probabilities to such events and at the same time it is also not possible to completely discount such impacts.

It is clear that science is not able to provide guidance. However, it must be acknowledged that the process of knowledge generation by the Intergovernmental Panel on Climate Change (which is responsible for collating state–of–the art knowledge on climate change) is highly methodical and systematically organized, leaving little scope for removal of ambiguity in near future.

Since bulk of the greenhouse gas emissions can be attributed to human activities, the response to climate change threat could be in the form of reducing/eliminating these emissions. Economic analysis that takes into

account the best guess projections only into account suggests moderate emission cuts. However, accounting for 'surprises' may call for strong precautionary approach.

Concept and Definition of the PP

The term 'precautionary principle' had its origin in the German word *Vorsorgeprinzip*[1]. Though the principle had its roots in the German environmental policy, it has entered the centre-stage of the global environmental policy in the past two-and-half decades with several global environmental treaties invoking the PP for decision making.

In simple terms, the PP conveys the common-sense based advice – *to err on the side of caution*. The principle intends to prevent harm to humans, environment, and eco-system at large. Before looking at some of the widely used definitions of the PP, it would be helpful to understand the context and rationale.

When the impacts of a particular activity – such as emission of hazardous substances – are not completely clear, the general presumption is to let the activities go ahead until the uncertainty is resolved completely. The PP counters such general presumptions. When there is uncertainty regarding the impacts of an activity, the PP advocates action to anticipate and avert environmental harm. Thus, the PP favours monitoring, preventing and/or mitigating uncertain potential threats.

There two widely referred definitions of the PP – the first one, The Rio Declaration (or Agenda 21) of 1992, 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."

[1] Interestingly, an alternative translation of this word would mean 'foresight principle' – which could have given an active and positive impression, as against the reactive and perhaps negative connotation attached with precaution.

This definition given primarily with environmental issues in focus is also extended to cover health issues. The second definition is based on 1998 Wingspread Statement on the Precautionary Principle and it states (Raffensperger and Tickner, 1999):

"…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 fully established scientifically. The process of applying the precautionary principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action. In this context the proponent of an activity, rather than the public, should bear the burden of proof."

It is interesting to note the differences between the two definitions. The first one stresses on 'serious or irreversible damage', whereas the second one states that precaution is relevant to 'harm' in general. Thus the second definition is typical of the way in which the precautionary principle is used by environmental advocacy groups. Some of the other key features of the definition worth noting include:

- Lack of full scientific certainty shall not be used as a reason for postponing: Though scientific uncertainty may not be used for any delay in action, this leaves scope for citing reasons such as poverty reduction priorities for postponing the actions.
- Cost effective measures: Though scientific uncertainty about the likely impacts prevails, stress on cost-effectiveness compels assessment (however accurate they may be) of costs of proposed actions and compare it with possible alternatives.
- Applied by states according to their capabilities: The capabilities of states, including economic and technical capabilities, could guide the final adoption of the precautionary principle.

It is worth noting the way the burden of proof is treated in these definitions. When an activity is likely to cause harm to the environment and/or humans,

the conventional practice is that the opponents of the activity have to provide the proof of the harmful effects caused by the activity. The precautionary principle, on the other hand, shifts the burden of proof to the proponents of the activity – i.e., the proponents have to establish that the proposed activity will not cause any harm to the environment and/or human-beings. Further, it is also argued that since scientific uncertainty is inherent in the environmental problems for which the PP is typically applied, the decision making process based on the PP may become more inclusive, participatory and democratic (Tickner, 2003).

Decision Theory and the PP

Decision making process involves at least three elements: choice between different alternatives, knowledge about the outcomes associated with each alternative, and an assessment of the outcomes based on the preferences. In practice, four types of decision problems are typically encountered:

- Decision under certainty – where one knows clearly the outcomes of different choices, and if preferences are precisely understood decision making process becomes rather simple.
- Decision under risk – where one knows the outcomes and the associated probabilities under different choices. Examples include asbestos causing respiratory disease and lung cancer.
- Decision under uncertainty – where one knows the outcomes under different choices but with no knowledge about the associated probabilities. Examples include antibiotics in animal feed and the corresponding human resistance of those antibiotics.
- Decision under ignorance – where one has no knowledge about the outcomes (and hence the associated probabilities) under different choices. Examples include the surprises associated with climate change.

Corresponding to these decision problems one can think of appropriate decision making frameworks. For decisions under risk, relevant framework is ‘prevention’ – i.e., actions taken to reduce known risks. Such preventive

actions include, for instance, eliminating the exposure to asbestos dust. For decisions under uncertainty, relevant framework could be what is sometimes referred as ‘precautionary prevention’ – i.e., actions taken to reduce potential hazards. Examples of such precautionary preventive actions include reducing/eliminating human exposure to antibiotics in animal feed. Finally, for decisions under ignorance, appropriate decision making framework would be ‘precaution’ – i.e., actions taken to anticipate, identify and reduce the impact of unknown risks. Examples consist use of broadest possible sources of information, including long-term monitoring, promotion of robust, diverse and adaptable technologies and social arrangements to meet needs.

The PP can be viewed as related to and evolving from the principle of ‘prevention’ and also the well-established principle of ‘polluter-pays principle’ for environmental management. All these are aimed at environmental management and can be seen as reflecting a progression in the law in the time at which they address the environmental problems. The ‘polluter pays principle’ addresses harms that have already happened and hence is reactive law. On the other hand, ‘prevention’ addresses the risks before harm occurs. Finally, ‘precaution’ anticipates and averts unknown and uncertain threats. Thus, both ‘prevention’ and ‘precaution’ constitute proactive laws.

Some authors have argued that the PP can be best considered in relation to the standard prescription of normative theories of choice under uncertainty and suggested consideration of what is known as *incompleteness* hypothesis. This hypothesis asserts that, any model of choice under uncertainty fails to capture all relevant aspects of the problem and hence will yield inaccurate assessment of the expected benefits of any given course of action. It further states that when the problem is poorly understood, the assessments will be generally over-optimistic and errors will be greater. Acceptance of the incompleteness hypothesis with respect to any given model of choice under uncertainty implies some form of precautionary principle in relation to decisions made. In other words, the standard prescription of choosing the action that yields the highest expected benefits may lead to bias in case of problems that are poorly

understood, and the precautionary principle reflects the effort to correct such bias (Quiggin, 2005).

Precautionary Principle in Practice

Several multilateral environmental agreements refer to precautionary principle in some form, but rarely provide elaboration into specific guidance. Similarly, several national level environmental initiatives invoke the precautionary principle. Here, a brief overview of some such initiatives is provided.

Multilateral Environmental Agreements

a) Montreal Protocol on Substances that Deplete the Ozone Layer, 1987 – 'Parties to this Protocol .. determined to protect the ozone layer by taking precautionary measures to control equitably total global emissions of substances that deplete it..'

b) The Rio Declaration on Environment and Development, 1992 – 'in order to protect the environment the precautionary approach shall be widely applied by states according to their capabilities.'

c) Framework Convention on Climate Change, 1992 – 'The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects.'

d) Convention on Biological Diversity, 1992 – does not directly use the term 'precaution' but interprets the 'serious and irreversible' harm referred in the Rio declaration in the context of biodiversity. It states, 'where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat.'

e) The Maastricht Treaty of European Union, 1992 – 'Community policy on the environment must aim at a high level of protection and be based on the precautionary principle, as well as on the principle that preventive action should be taken, that environmental damage should be rectified at source and that the polluter should pay.'

f) Cartagena Protocol on Bio-safety, 2000 – 'In accordance with the precautionary approach the objective of this Protocol is to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking into account risks to human health, and specifically focusing on trans-boundary movements.'

g) Stockholm Convention on Persistent Organic Pollutants (POPs), 2001 – The objective states, 'Mindful of the precautionary approach as set forth in Principle 15 of the Rio Declaration on Environment and Development, the objective of this Convention is to protect human health and environment from persistent organic pollutants.' This treaty operationalizes precaution with explicit reference to it in the preamble, provisions for adding POPs, and determination of best available technologies.

National Experiences

a) Asia – Even though several countries have adopted well drafted environmental and biodiversity laws, reference to 'precautionary principle' is missing. For instance, Malaysia's National Biodiversity Policy makes explicit reference to the Convention on Biological Diversity (1992) but refrains from using the term 'precautionary principle'. Similarly other countries in the region, Vietnam, Indonesia and Lao PDR also do not directly invoke precautionary principle in their laws. On the other hand, in several countries (e.g., India and Pakistan) the highest judicial authority has cited 'precautionary principle' in its judgments.

b) Africa – Several countries have made explicit reference to 'precautionary principle' in their laws. Examples include the 1997 Mozambique environment legislation, the 1996 general environmental law of Cameroon, and South Africa's National Environmental Management Act.

c) Latin America – Many countries in this region have incorporated precaution as guiding principle in their national environmental laws. Examples include general and biodiversity related environmental laws in Argentina, Peru, Costa Rica and Ecuador.

d) Australia – The precautionary principle is deeply rooted in Australia's environmental policy, as reflected in the Inter-Governmental Agreement on Environment of 1992, and the Commonwealth Environment Protection and Biodiversity Conservation Act of 1999.

As mentioned above, precaution is deeply entrenched in the environmental legislations of several European countries. On the other hand, in the United States of America precaution is rarely stated explicitly in any of its laws. However, the precautionary the principles are well entrenched in several protection acts such as Endangered Species Act of 1973, and the Wild Bird Conservation Act of 1992.

Late Lessons from Early Warnings – The European Experience

The European experience in invoking the Precautionary Principle for environmental management is summarized in a report by the European Environment Agency (Harremoes, *et al*., 2002) and it provides useful insights on what lessons can be learned about the PP from several case studies. These *late lessons* include:

Respond to ignorance as well as uncertainty: In simple terms this lesson demands that the regulatory appraisal must not restrict itself to the direct and obvious impacts. For instance in case of climate change, the response must take into consideration the 'surprises' like melting of glaciers along with rise in temperature.

Research and monitor for 'early warnings': This lesson highlights the importance of general research and long-term monitoring – especially when uncertainty and ignorance surround the regulatory appraisal.

Search out and address 'blind spots' and gaps in scientific knowledge: The 'blind spots' can be in the form of gaps in scientific knowledge within a discipline, gaps in knowledge assimilation across disciplines, and inability to identify the new problems while basking in the satisfaction of solving an existing problem. The case of the inability of the dominant discipline involved in the regulatory appraisal process in accepting the link between halocarbons and the depletion of stratospheric ozone illustrates the first kind of 'blind

spot'. On the other hand, the third kind of 'blind spots' can be illustrated through the case of smoke stacks built for sulphur dioxide. The proponents of taller stacks have claimed removal of the problem in the local area, but have failed to recognize the problems arising from cumulative emissions and long-range transport. For sustainable regulatory appraisal it is prudent to eliminate such 'blind spots'.

Identify and reduce interdisciplinary obstacles to learning: In case of asbestos setting of standards was strongly influenced by the medical clinicians who typically focus on acute effects. The toxicology and epidemiology of long-term chronic effects remained largely neglected in case of asbestos for long due to lack of active cross-disciplinary learning. Build-up of knowledge through inter-disciplinary approach must be promoted for effective regulatory appraisal.

Ensure that real world conditions are fully accounted for: While assumptions are essential for proper understanding of any theory, generalization based on the theory alone without real world cross-check may lead to biased regulatory appraisal.

Systematically scrutinize and justify the claimed 'pros' and 'cons': When dealing with scientific uncertainty and ignorance, the regulatory appraisal process will have to deal with multiple perspectives. In such cases it would only be appropriate to not only systematically cover all perspectives, but also examine the claimed benefits alongside the potential risks.

Evaluate alternatives and promote robust, diverse and adaptable solutions: The contribution of second generation CFC substitutes to ozone depletion was largely ignored due to the technological commitments made with respect such substances. As a result other alternatives were not given due importance.

Use 'lay' and local knowledge as well as all relevant specialist expertise: It would not be prudent for the regulatory appraisal to ignore the time-tested 'thumb rules'. Balanced approach demands that knowledge from lay persons

(of course subject to the same intensity of crucial scrutiny as specialist knowledge) to be judiciously mixed with the specialist/expert knowledge.

Take account of wider social interests and values: To be effective, the regulatory appraisal must not detach itself from the prevailing ethical and socio-cultural values.

Maintain regulatory independence from economic and political special interests: The previous lesson must not imply that the regulatory independence is undermined by the economic and political special interests. The regulatory appraisal must maintain distance from such interests.

Identify and reduce institutional obstacles to learning and action: The regulatory appraisal must be wary of the influence of institutional inertia and obstacles to learning (especially when the knowledge is supplied by diverse interest groups) on undermining the progress in addressing the problems.

Avoid paralysis by analysis: While several of the above lessons promote accumulation of information for informed regulatory appraisal, an obvious question that needs attention is: How much information is sufficient to galvanize action? This crucial last lesson cautions against the dangers of information accumulation and inordinate delays in action.

Precautionary Principle – India

The precautionary principle has not been explicitly mentioned in any environmental laws in India. However, the Supreme Court of India has invoked this principle while passing judgments. A couple of such cases are discussed here (see Chowdhury and Sabhapandit, 2007 for further details):

- In 1996 while deliberating on *Vellore Citizens Welfare Forum versus Union of India* case, the Supreme Court of India first invoked the PP. Drawing support from various Articles of the Constitution of India and arguing that the PP is part of customary international laws (and hence part of domestic laws), the Court has strongly supported the application of precautionary principle. In fact, the Court has also applied the reversal of

burden of proof and demanded that the proponents of the activity must demonstrate that the activity is environmentally benign.

- In *AP Pollution Control Board versus Prof. M.V. Nayudu* case in 1999, the Supreme Court has reiterated its earlier stand on the precautionary principle and demanded that the burden of proof should rest with the person/entity proposing the activities (which may have harmful effects on the environment and/or human beings).

As an offshoot of the judicial recognition the National Environmental Policy adopted precautionary principle as a guiding principle. However, it is still a long way to go before the PP takes its rightful place in Indian environmental laws and even more importantly gets effectively implemented.

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