specifications, or if that fails, avoiding industrial development in disaster-prone areas. The final sanction of unacceptability is, of course, the banning of the guilty plant, process or product altogether and thereby remove the risk of Na-Tech entirely.

The tools that could prove vital in moving towards a sustainable approach to development in general and with regard to Na-Techs in particular could be:

- the polluter pays principle
- the role of industry
- public opinion

5.6 Polluter Pays Principle

This policy tool implies that any polluter should bear the expenses for carrying out pollution prevention measures or paying for damage caused by that pollution. The theory is that by internalizing the costs of environmental protection into the price of goods, the market will favour environmentally sound products. Because the environmentally damaging products should cost more, consumers would shift towards less polluting substitutes. The theory would follow up to the choice of technology by the manufacturers. This principle has been re-affirmed at the global level as an international environmental principle, with Principle 16 of the Rio Declaration stating;

"National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment".

The basic effect of implementing such a principle would be to make safe operations in the best interest of the company. Such a policy would then be translated into action by use of safer processes or more stringent design and operations. In turn, improvements in general safety would provide more of a safety buffer in the event of a natural event that threatens to turn into a Na-Tech.

5.7 Industry - Corporate Responsibility and Liability

Industry could be seriously affected by a more detailed understanding of Na-Tech processes. At the base of this is the ability to insure against the risk of an event occurring.

The insurance industry exists to underwrite risk. In a crude sense, if the insurance industry is prepared to cover an activity, then it's risks have been deemed "acceptable", at least in financial and liability terms. However, the recent spate of natural disasters having an impact on expensive property has caused massive losses in the insurance industry. If those natural hazards, which have been increasing dramatically in recent years, both in terms of frequency and impact, can be linked with such anthropogenic events such as global warming, i.e. Slow Na-Techs, the insurance industry can reasonably be expected to pull out of industries that are linked to global warming. The burden of liability would then have to be covered by the industry itself, without insurance. This could have both good and bad consequences for environmental implications. For example, if a limited liability company is found guilty of pollution, the company will have to pay cleanup costs. Under one scenario the company cleans up, with the incentive to improve operations and change or alter the problems caused. Under this scenario, the liability becomes an action for positive change.

However, if those costs are extremely high and there is no insurance coverage, the company may simply declare itself bankrupt. This means that the damage has been caused but not remedied. Companies could also use this tactic to avoid liability costs. If companies divide their operations into sufficiently small, independently liable companies, in the event of a pollution incident it would be cheaper to simply close the company and move the operations to another small related but independent company within the Group. At the moment, the problems of quantification of environmental damage and liability is a new area but as the knowledge base expands the role of insurance will become increasingly important in environmental decision-making. The recent trend is for insurance companies to pull out of environmental liability clauses. At the same time, legislation to improve industry operations have been proliferating, providing more and more opportunity for prosecution and liability. There is an urgent need to consider the implications of this trend and how industry can move into a partnership with governments for a positive response to the problems of environmental damage and Na-Techs.

5.8 Public Opinion

One of the driving forces to move towards an industry-government partnership is likely to be public opinion. This reverts back to previous points about the acceptability of a risk; if the public opinion is turned against a policy because of a disaster, then the costs to the industry and the government can be extremely high. One poorly handled accident is all that is required to turn a suspicious public into an aggressive campaign with long term political and financial implications. The Non-Governmental Organizations (NGOs) and the media will have a particularly strong role to play here in raising awareness of issues and moving the debate into a public forum.

Educational campaigns to improve the personalisation of the relationship between the public and the environment could help this shift of support. As argued in Section V.1., the development of a personal stake in the environment could strengthen public views on development acceptability. In turn, the environment becomes a stakeholder for development decision-making. Such a strengthening of public appreciation of enviromental concerns could help to convince industry of the needs for responsible policies as an alternative to the "back-door" approach of closing down companies as an alternative to change.

VI. A CHALLENGE FOR THE GLOBAL COMMUNITY - THE UNEP PERSPECTIVE

The international community in general have an enormous role to play in coping with the melting pot of disasters, both natural and anthropogenic. The global challenge to recognize and address the problems of disasters and sustainable development is not easy one, but is the subject of a great deal of work in many UN and non-UN organizations.The precedents for international involvement are clearly laid down. For example, Principle 18 of the Rio Declaration notes that

"States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those States. Every effort shall be made by the international community to help States so afflicted".

Similarly, Chapter 7 of Agenda 21 of the Rio Conference notes that sustainable development cannot be achieved in many countries without adequate measures to reduce disaster losses, and that there are close linkages between disaster losses and environmental degradation.

As one of the UN bodies focussing on environment and development issues, the United Nations Environment Programme is mandated to tackle such complex and vital problems by a triangle of influence that combines:

- **•Raising Awareness** e.g, the improvement of risk communication to allow the people to take a more active and effective input into the policy-making process
- **•Catalyzing Action** e.g, encouraging and developing mechanisms to identify, quantify and disseminate information on the impacts of disasters, (whether natural, technological or Na-Tech) on the environment and the implications of industrial zoning and planning.
- **•Strengthening Capacity** e.g, helping to improve the prevention of, preparedness for and response to disasters, irrespective of cause at the local, national and international level.

Two examples of practical programmes within UNEP include the APELL programme and the experimental development of a UN Centre for Urgent Environmental Assistance.

6.1 Awareness and Preparedness at the Local Level (APELL)

The APELL programme was established in 1988 in recognition of the vital importance of prevention and preparedness policies to effective disaster management. This programme organizes training workshops at the local level to educate industry, government and the public in the best approaches that are relevant to their situation. The programme, which is supported by industry, is expanding in response to requests from individual countries, with the APELL Handbook being translated into more than 13 languages. The Handbook describes a ten-stage process to guide local communities in strengthening their accident prevention and emergency response capability.

6.2 UN Centre for Urgent Environmental Assistance (UNCUEA)

Despite prevention programmes, disasters will invariably continue to occur. In response the UN Centre for Urgent Environmental Assistance was established on an experimental basis in 1992. The Centre has been working to find methods of improving the UN response to environmentally significant disasters, working in close co-operation with the Department of Humanitarian Affairs who have a mandate to coordinate all operational responses to disasters. Studies carried out for UNCUEA have shown that there are significant gaps in the existing response mechanism for environmental emergencies on land. A recent Governmental Advisory Meeting recommended the establishment of a mechanism to complement existing services in order to provide a "backstopping" or "safetynet" function for countries who find their own capacities overwhelmed by an environmental emergency. The proposed unit would work through the existing switchboard service of the DHA emergency telephone system to place countries who need advice and information in direct contact with countries who have the requisite knowledge and resources and are prepared to share their expertise.

6.3 Continuum from Relief to Development (UNDP)

These UNEP developments are operating in cooperation with an important initiative launched by the UNDP[2] known as the "Continuum from Relief to Development" project. An Inter-Agency Task

[2]United Nations Development Programme

Force, comprising two Inter-Agency Working Group has been established to elaborate an operational framework to;

- bring disaster management more fully into the development debate
- provide a practical framework to strengthen the capacity of affected populations to overcome suffering and vulnerability
- to agree on flexible, cost-effective and systematic funding and operational practices in continuum activities.

The Continuum project is represented within UNEP by a joint UNEP/UNCHS Task Force to integrate and strenghten the Continuum related acitivities of the two organizations. The overall targets are reflected in Agenda 21 recommendations which aim to;

"enable all countries, in particular those that are disaster-prone, to mitigate the negative impact of natural and man-made disasters on human settlements, national economies and the environment".

VII. MOVING FORWARD

Having examined the bases for Na-Techs and the need for more environmental consideration in the disaster management process, it can be concluded that there is;

- a need to bring environmental considerations firmly into disaster management terminology, methodology and organization;
- a need to support reseach to understand environmental impacts of disasters, especially Na-Techs;
- a need to refine risk assessment methods to incorporate the findings of such research;
- a need to incorporate such risk assessment conclusions into national and international policy making processes to enable progress towards the goal of sustainable development;
- a need to involve industry in the development of appropriate mechanisms in meeting the needs of sustainable development;
- a need to support developments in liability policy to ensure that environmental considerations are more completely tackled, and that there is;
- a need to encourage the personalisation of individual relationships with the environment

Na-Techs can be seen as a symbol as well as a threat - a symbol of our relationship with nature. Either we continue along the path of increasing conflict between nature and development as witnessed by the rise in Na-Tech emergencies, or we can move towards a more complementary sustainable approach. This encourages efficient, wise and safe use of resources with minimum impact on natural resources. Such an approach requires the full incorporation of realistic environmental and synergistic considerations in policies that currently aggravate, magnify or cause natural hazards to develop into Na-Tech disasters. In the long term, the benefits will certainly outweigh the costs. What is now needed is a commitment to provide the resources to meet the needs as identified and help move the world community into a safer and more sustainable future.

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