Introduction

Kendra Okonski and Julian Morris

Are modern industry and economic activity causing an irreversible decline in the state of the natural environment, leading to ever-worse problems with human health? Are children the unwitting victims of our profligate society? Are we in a 'race to the bottom' that will ultimately lead to the demise of humanity?

The purpose of *Environment and Health* is to help readers find answers to these questions. To that end, the book offers an overview of the available scientific evidence concerning the impacts of pesticides, dioxin, nitrates, radiation, endocrine disruptors ('gender benders'), and global warming. In many cases, the science is extremely complex and a simple answer concerning impacts would not be feasible. However, in all cases it is clear that hysteria is unwarranted and that the level of regulatory intervention is either already sufficient or even excessive.

Hydric acid: a case study in regulatory decision-making

The issue of hydric acid makes for a useful point of departure because it has for many years proved vexing to those who seek a world free from risk. Hydric acid is a colourless, odourless, and tasteless chemical that is used in many industrial processes and also in certain domestic applications. Sadly, hydric acid is responsible for the deaths of thousands of people every year, mostly as a result of accidental inhalation. In addition, prolonged exposure to the solid form of hydric acid causes severe tissue damage. Symptoms of hydric acid ingestion can include excessive sweating and urination,

and possibly a bloated feeling, nausea, vomiting and body electrolyte imbalance. For those who have become dependent, withdrawal of hydric acid means certain death.[1]

Research indicates overwhelming support in many places for a ban on hydric acid.[2] Nevertheless, it remains widely available. This may in part be because hydric acid is regularly precipitated from the atmosphere, making a ban not merely be impracticable but impossible. Another reason could be that because so many people are dependent on it, governments fear that any attempt to ban it would cause widespread civil disobedience.

One of the editors of this volume often uses the hydric acid case as an example in courses for graduate students. He provides them with the information above and then asks them to choose between three options: (1) an immediate ban on all use of hydric acid; (2) an immediate imposition of extremely tight controls on all uses; (3) no (additional) restrictions pending further information. Usually, a large proportion of his students choose options (1) or (2) but some always choose (3). What does this tell us? Well, first, it suggests that most people have a strong impulse to impose restrictions on the use of chemicals that are believed to cause harm without asking about what precisely the chemical is used for and what the implications of such restrictions might be. Second, it suggests that at least some students understand that regulatory decisions must be based on more than mere cursory information of the kind used by propagandising single issue pressure groups.

Chemicals in agriculture and food

Although we are unaware of any attempts to put pressure on governments to ban water (at least in its unadulterated form), it is one of the few commonly used chemicals that seem to have avoided the accusatory finger of activists.

The same cannot be said for chemicals used in agriculture and foods. Many of these chemicals confer significant benefits to human beings – for example by reducing the cost of food or increasing its shelf life. Some chemicals have even arguably had environmental benefits – for example, chemicals that increase yields mean that more food can be grown on less land, reducing pressure on wild land; meanwhile, chemicals that enable weeds to be killed with minimal tillage reduce the soil erosion that results when land is ploughed.

In spite of these observable benefits, there has been a strong push for regulation of chemicals used in agriculture and food. To some extent one can understand this impetus, since some of the early pesticides were highly ecotoxic, while many early food additives were poisonous in the doses present in food.[3] However, these chemicals were for the most part eliminated from the food chain by the early part of the 20th century – largely through the voluntary actions of companies seeking to avoid harming their customers. As a result, concerns shifted to other issues, such as cancer. Fears were heightened in the 1950s, when tests began to show that, when given in sufficient concentrations, many of the chemicals used in agriculture and food caused cancer in rodents.

However, over time it became clear that a large proportion of all chemicals, synthetic and natural, are carcinogenic – as Professors Bruce Ames and Lois Swirsky Gold show in their chapter:

> *Human exposure to naturally occurring rodent carcinogens is ubiquitous and dwarfs the exposure of the general public to synthetic rodent carcinogens.*
>
> *The natural chemicals that are known rodent carcinogens in a single cup of coffee are about equal in weight to one year's worth of ingested synthetic pesticide residues that are rodent carcinogens. This is so, even though only 3 per cent of the natural chemicals in roasted coffee have been adequately tested for carcinogenicity. This does not mean that coffee or natural pesticides are dangerous; rather, assumptions about high-dose animal cancer tests to assess human risk at low doses need re-examination.*

Moreover, not all substances that are carcinogenic at high doses will also be carcinogenic at low doses. The body is capable of dealing with certain amounts of certain types of carcinogen, through various process.[4] So, restricting the use of chemicals merely on the basis that they are rodent carcinogens simply doesn't make sense. It is not even clear that we should aim to reduce all such chemicals to the very low levels that are required in most existing regulations. As Ames and Gold explain:

> *It is expensive to reduce low-level human exposures to synthetic chemicals which are rodent carcinogens through regulatory efforts. Moreover, regulations can do nothing but reduce chemical concentrations which are already miniscule, and they are unlikely to have any effect on cancer rates. Such regulatory efforts distract from the major task of improving public health through increasing scientific understanding about how to prevent cancer (e.g. which aspects of diet are important), increasing the public's understanding of how lifestyle influences health, and improving our ability to help individuals alter their lifestyles.*

Our obsession with the potential carcinogenic effect of synthetic chemicals used in agriculture and food production has distracted us from these much more important concerns – concerns about what kinds of foods we should eat if we want to obtain the micronutrients that help maintain healthy bodily defences, so that we can deal with the very large number of assaults that are made against our body every day, mostly by natural substances and processes.

The evidence suggests that eating fresh fruit and vegetables helps the human body defend itself from cancer. By contrast, avoiding synthetic agro-chemicals present as residues in food does not. So, people who eat less fresh fruit and vegetables because they buy the expensive 'chemical free' varieties are actually harming themselves.

The broader consequences of the anti-scientific attack on the use of synthetic chemicals in food and agriculture are scarier still. What

if farmers in poor countries were discouraged or, far worse, prevented from using these technologies in order to ensure that their produce will be acceptable for the over-protected consumers in rich countries? Outputs would fall and they would experience greater uncertainty (one of the huge advantages of synthetic agrochemicals is that it enables much more stable production levels), which would mean less on their own plate as well as lower income. Do we really want our daft obsession with the absurd concept of 'chemical free' food to end up holding back development in poor countries? How does that rest on the conscience of the campaigners against pesticides and other agrochemicals?

Gender benders?

The evidence amassed by Ames and others has made the chemophobic campaign against supposedly carcinogenic chemical additives increasingly implausible. In response, activists have shifted the debate to new – and equally dubious – territory. In particular, activists have claimed that a variety of chemicals are interfering with the hormone systems of fish, mammals and other animals and, as a result, changing sex ratios, reducing human fertility, and causing cancer.

If these activists had been campaigning against the birth control pill, they might have been on to something. Because, of course, the birth control pill is *intended* to interfere with the hormone system. But even the Pill and various natural oestrogens don't seem to be doing much damage to the human species.

However, the activists are very definitely not talking about the birth control pill. Perhaps this is because they recognise that the Pill is perceived by too many of their constituents to have massive benefits. Perhaps it is because the Pill is not primarily used in agriculture or industry. Whatever the reason, they have chosen a very different target; their target is the same old list of industrial and agricultural chemicals all over again: PCBs, DDE (a breakdown product of DDT) and other 'persistent organic pollutants' (POPs),

TCDD (a dioxin), and other industrial and agro-chemicals.

Stephen Safe, a professor of Veterinary Physiology & Pharmacology at Texas A&M University, and the director of the Center for Environmental and Rural Health analyses the scientific arguments for the 'endocrine disruption' hypothesis and finds that

> *There are no apparent global changes in sperm counts and fertility, rates of hypospadias and cryptorchidism, and birth sex ratios. Testicular cancer is increasing in most countries, but it is not correlated with other indicators of male reproductive capacity. Moreover, testicular cancer is increasing while DDE and other POPs are decreasing, suggesting that exposure to these compounds is not linked to testicular cancer.*

While Safe accepts that certain 'endocrine active' chemicals (such as natural oestrogens and perhaps the birth control pill) have adverse effects on fish and wildlife in certain circumstances, the same effects are not observed in humans. Moreover, Safe points out that if we are concerned about human exposure to endocrine disruptors, then we should be more concerned about natural endocrine-disrupting substances than synthetic ones.

Nitrate nonsense

Dr. Jean-Louis L'hirondel, a practicising doctor in Caen, France, explores claims about nitrates which have been used to justify numerous regulatory directives. Nitrates were previously used as medicines, and were replaced with aspirin and corticoids at the beginning of the 20th century. About thirty years ago, a variety of allegations were made that nitrates cause 'blue-baby syndrome' and exacerbate cancer risks in adults.

L'hirondel's assessment indicates that both claims "lack scientific basis" based on studies conducted in the last thirty years:

> *What causes methaemoglobinaemia in infants is not alimentary nitrates, but nitrites formed in the feeding bottles … It has been virtually eradicated in developed countries where people are familiar with basic hygiene rules for preparing bottles of formula milk.*

And as stated by the European Commission's Scientific Committee for Food in its 1995 "Opinion on Nitrate and Nitrite":

> *Epidemiological studies thus far have failed to provide evidence of a causal association between nitrate exposure and human cancer risk.*

Radiation and the no-threshold myth of cancer

In the case of radiation, the "Linear No-Threshold Assumption" has been a "holy mantra", according to which even the lowest, near-zero doses of radiation may cause cancer and genetic harm in human beings. As with other causes of cancer, the linear no-threshold assumption simply does not hold as a general rule.

While the damaging effects of high doses of ionizing radiation are well established, the same is not true for low doses. Dr. Zbigniew Jaworowski of the Central Laboratory for Radiological Protection in Warsaw, Poland, points out that:

> *In some areas of the world, natural radiation doses to man and to other biota are many hundreds times higher than the currently accepted dose limits for the general population. No adverse health effects were found in humans, animals and plants in these areas.*

Indeed, Jaworowski argues that there are considerable benefits associated with certain uses of low-dose radiation, including medical uses, and there may even be an 'hormetic' effect. What is clear is that the current regulated limits of exposure are unnecessarily low:

During the past several decades there has been a tendency to decrease – to ever-lower values – the exposure dose applied in standards of radiation protection. … Justification for such low levels is difficult to conceive, as no one has ever been identifiably injured by radiation while standards set … in the 1920s and the 1930s were in force, involving dose levels hundreds or thousands of times higher.

Dioxins

Dr Hans E. Müller, a chemist and physician, and the former director of the Public Health Laboratory in Braunschweig, Germany, shows how an accident in Seveso, Italy, in 1976 was viewed by the world as a tragedy of apocalyptic proportions, confirmation of environmental activists' worst fears, and justification for an enormous number of regulations on dioxin.

The accident at Seveso sadly caused many deaths – of animals. Not one single human being died. In fact, the main human impacts were the relocation of many thousands of people living near the factory, a large number of cases of chloracne – a very unpleasant skin condition – and a much smaller number of more serious, but not fatal, toxic effects.

Müller shows that dioxin "has frequently been the subject of scaremongering by campaigners and others, who claim that it induces cancer", and equally, "the producers of dioxin have sought to counter such fears" so some controversy has erupted over the 'true' impact of dioxin.

Dioxins – a class of chemical compound that includes the feared TCDD – are produced both during natural burning processes and as a result of certain industrial processes. While exposure to certain dioxins at very high concentrations may have negative health consequences, "such concentrations are seldom reached even in exposed and highly contaminated humans". Since humans consume most of their dioxins in the food they eat and since concentrations in food are at levels that are barely detectable, let alone likely to do any harm, it is very unlikely indeed that we are being harmed by dioxin.

Global warming and human health

One of the favourite chestnuts of the modern environmental movement is the fear that we are having a generalized impact on the environment that will come back to haunt us at some stage in the ill-defined distant future in some unspecified way. In an attempt to put some meat on these rather vague bones, some activists have invented stories about mankind being afflicted by various plagues.

A good example of this is the alleged threat of an increase in malaria as a result of global warming. Professor Paul Reiter, a British expert in vector-borne disease and a 22-year veteran of the US Centers for Disease Control, assesses this threat, which rests in large part on the erroneous assumption that malaria is a tropical disease, and finds it wanting.

Reiter discusses the complex history and science of malaria, which was once endemic in Europe but was largely eradicated here during a time of warming temperatures. He notes, however, that Holland – hardly a tropical country – was not certified malaria-free until 1970.

The story of malaria in Europe is widely known and readily accessible in any good library. Nevertheless, uninformed predictions on the spread of this and other vector-borne diseases to temperate areas are commonplace – even in the scientific literature – and are widely quoted in public discussion of national and international policy on global warming.

Reiter is concerned like his fellow contributors that, by focusing on global warming, the world will misprioritise badly-needed policies to eradicate malaria and other vector-borne diseases.

[No scientist] denies that temperature is a factor in the transmis-

sion of mosquito-borne diseases, and that transmission may *be affected if the world's climate continues to warm. But it is immoral for political activists to mislead the public by attributing the recent resurgence of these diseases to climate change, particularly in Africa. The true reasons are far more complex, and the principal determinants are politics, economics, and human activities. A creative and organized application of resources to correct the situation is urgently needed, regardless of future climate.*

Another human health problem activists are keen to blame on global warming is temperature-related deaths. In the summer of 2003, a heat wave swept through Europe and was the proximate cause of thousands of deaths. Professor Bill Keatinge, Emeritus professor at Queen Mary School of Medicine and Dentistry, University of London, suggests that the actual number of deaths from heat were probably much lower. He shows that although the mortality rate rises during the first two days of a heat wave, this is followed by lower than normal mortality rates. This is probably because many who die are already very ill, and would have died within the following two or three weeks.

Indeed, the reality is that cold temperatures remain the biggest contributor to human mortality. Keatinge shows that:

Studies of actual changes in heat-related mortality show that as temperatures have risen, the increase in heat-related mortality produced by a particular level of high temperatures has fallen. Summer temperatures have risen at least 1°C both in London and in the subtropical region of North Carolina since 1981. However, heat-related mortality has not risen in London, and has virtually disappeared in North Carolina despite humidity also increasing there and wind decreasing.

Physiological adjustments can be helpful in preventing such deaths, in any case, and should be encouraged, says Keatinge:

People in countries with hot summers seem to be more effective at protecting themselves from heat. The siesta of southern Europe is an obvious example. In North Carolina, a large increase in air conditioning in the region seems to be responsible for the virtual disappearance of heat-related mortality.

Regulatory responses to 'chemophobia'

Professor Lucas Bergkamp and Dr. Jaap Hanekamp write about regulatory regimes purporting to address chemical risks, such as the European Union's REACH (Registration, Evaluation, and Authorization of Chemical Substances) proposal. The regulation has been driven in part by unfounded fears on the part of the public.

It is probably true that due to a number of factors, including the way the news media covers chemical issues and government responses, the public is confused about chemicals, their benefits, and risks. Indeed, public 'chemo-phobia' may be widespread in Europe.

Bergkamp and Hanekamp argue that misprioritised regulatory actions not only waste money and human effort. By aiming at the wrong target, we may inevitably expose ourselves to unforeseen risks.

The economic cost of chemical risk regulation, up to a point, may reduce risk but once we are over that point, it will in any event (even if it does not more or less directly increase risk) increase risk indirectly by making us poorer. Since poverty is negatively correlated with health, average lifespan and environmental conditions, the massive administrative cost of the REACH regime will lead to a Europe with worse public health and environmental conditions.

The precautionary principle: a good guide for decision-making?

Many regulatory actions on environment and health issues including the REACH regime have been driven by reliance on the precautionary principle. The World Health Organization also promotes the precautionary principle as the basis of proposed regulatory actions for its members.

The precautionary principle emerged in the late 1960s in response to campaigns by environmentalists to limit the use of new technologies – specifically nuclear power.[5]

As it is currently conceived, the Precautionary Principle (PP) consists of two key components:

1 Reversal of burden of proof: anyone proposing to use a technology must ensure that it is safe before use.
2 Increase in the standard of proof: more rigorous testing of technologies is required before they can be declared 'safe'

The particular standard depends on which version of the PP is employed – Strong or Weak.

The Strong PP requires absolute safety. Thus Jeremey Leggett, then with Greenpeace, stated in 1990:

> *For organizations like Greenpeace, what comes first must be the needs of the environment … the modus operandi we would like to see is: "Do not admit a substance unless you have proof that it will do no harm to the environment" – the precautionary principle … the fact that proof of harm might come too late – or that proof is invariably hard to demonstrate with absolute certainty – only augments the license given to the polluters.*

The Weak PP is more ambiguous about what level of proof is required. Thus, Principle 15 of the Rio Declaration states:

> *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.*

If applied generally, strong PP would shut down civilisation because every technology carries with it unknown risks. Clearly this is impracticable!

The Weak PP, on the other hand, is very vague. But vagueness is not a merit. It enables arbitrary action – including the imposition of restrictions regardless of costs or benefits.

General application of the PP may prevent people from being exposed to some new risks, but it also prevents them from reducing their exposure to existing risks. New technologies generally provide net benefits; if they did not, there would be little incentive to produce them. Examples of such benefits include higher crop yields, speedier communication, better medicine, clean and reliable energy sources, almost no air pollution and better, less polluted, water.

That new technologies have provided net benefits to humanity is obvious from long term trends in available food supplies, infant mortality, access to safe water and sanitation, and life expectancy, all of which have improved remarkably over time. As a result, a large part of humanity is now better nourished, less frequently exposed to water-borne pathogens and air pollution, and less likely to die or suffer ill effects as a result of disease.

The dangers of over-regulation

Application of the PP is likely to result in over-regulation, which may prevent the adoption of technologies that would make the world a safer place. Over time, such excessive regulation also tends to undermine the social institutions that have historically helped us to manage risk. Laws and norms that have developed over hundreds of years and which are principled, clear, abstract and universally applicable are replaced with constructivist regulations that are predicated on false assumptions, opaque, concrete, narrow and applica-

ble, if at all, only to a small number of cases.

Even where regulations do have direct health benefits, they may cause more harm to health overall. This would be the case if more human lives could be saved by redirecting the resources invested in complying with the regulations towards other programs. For example, suppose that a regulation limiting emissions of a certain pollutant saves ten lives. Now, if it costs a billion dollars to implement the regulation, the question is: could those billion dollars have saved more lives? If the answer is that in an alternative program the billion dollars could have saved 1000 people, then the regulation effectively killed 990 people.

Consider, for example, the regulation of low-dose radiation – which makes our hypothetical example seem like good value. Dr. Zbigniew Jaworowski writes:

> *Simply to adhere to regulations based on standards which establish low dose limits [for radiation], society is paying out hundreds of billions of dollars with no apparent benefit. Each human life hypothetically saved by implementing the present regulations costs about US$2.5 billion.*

Professors Bruce Ames and Lois Swirsky Gold write, "Because there is no risk-free world and resources are limited, society must set priorities based on cost-effectiveness in order to save the most lives…One estimate is that the United States could prevent 60,000 deaths per year by redirecting resources to more cost-effective programs."

The power of pressure groups

But if all this is true, you may ask, what is driving these regulations? The clear answer that emerges in *Environment and Health* is that regulations are being driven by the demands of pressure groups rather than by objective science. Under the shroud of 'protecting public health', these pressure groups have exploited the public's ignorance of complex scientific subjects in order to promote their own narrow agendas.

Single issue pressure groups are successful at shifting the policy agenda because they are able to devote so much of their time, money and resources to their cause. These groups, which often claim to promote the interests of specific groups of people (such as consumers, or the elderly) or even entities (such as 'the environment'), typically start out with an agenda and utilise evidence only where it fits with that agenda. Rather than promoting objective science, they focus on achieving widespread attention in the media and on developing close relationships with regulators and politicians.

By contrast, the people who are negatively impacted by the policies promoted by pressure groups tend to be large in number, widely dispersed and have many other more important concerns. These people remain 'rationally ignorant' of the evidence relating to claims made by activists, because the cost to the average individual of identifying the relevant evidence would exceed the benefits. Moreover, the impact may be unseen – for instance, goods and services may be made more expensive or even regulated out of existence, forcing consumers to spend more of their money for the same basket of goods or for expensive substitutes.

Pressure groups, government and the decline of science

Underlying this misallocation of resources in inappropriate regulations is distorted science concerning environment and health risk issues. One reason is the dominant role played by government in the funding of scientific research. Through its control over the purse strings, government has considerable leverage over which projects are funded. If government funding decisions were made entirely by far-seeing sages, then this would perhaps not be a problem. Unfortunately, the supply of such sages appears to be rather limited.

In place of all-seeing sages, government appoints funding committees. Like the government officials who make regulatory

decisions, the officials on these funding committees are susceptible to the concerns of vocal and persistent single issue pressure groups. As a result, some scientists may be encouraged by this system to exaggerate the potential risks of the issue they are investigating in order to win the support of friendly activists, who will support them in their bid for funding. As a result, less honest scientists will tend to crowd out more honest scientists. Professor Safe observes:

> *The concern with this issue and others is that scientists/regulators develop vested interests in specific problems, and there is great reluctance on their (our) part to say "enough is enough." With limited funding available, this can seriously impede research that addresses more pressing environmental and human health issues.*

Meanwhile, activists utilise the outcome of this distorted research in order to generate public fears of a particular issue and thereby promote political action, such as a regulatory ban on a specific product. Activists use emotive appeals to capitalise on the public's rational ignorance. Meanwhile, scientists who stick to the facts are often portrayed as heartless, soulless individuals with little regard for humanity.

As with the regulatory interventions described above, the distorted priorities in science funding likely costs lives. When science is funded selectively on the basis of hype and fear, fewer resources are available to fund other scientific research priorities which might have more positive impact on human health.

In spite of the pressures for science to be distorted, sufficient high-quality research has been and continues to be carried out to enable a rational evaluation of most issues that have been promoted by single issue pressure groups. As noted above, the contributors to this book consider some of the more high-profile such issues. Here we summarise some of the conclusions reached.

Whose health organization?

According to the World Health Organization Constitution of 1948, health is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." While this is a laudable goal, it is also vague and unclear how it is best achieved – through the actions of the WHO, by individual governments, or perhaps by enabling individuals to pursue their own health objectives without undermining their freedoms, including the freedom to engage in rewarding but risky activities, whether for economic or merely psychological gain.

The WHO has recently moved into new territory, engaged with global and national regulatory aspects of human health. In part, the WHO may perceive that emerging global health issues require tangible solutions rather than simply allowing nations to decide their own priorities. Indeed it is far from clear that regulatory solutions pursued for 'the public interest' will benefit everyone, but clear that the costs of these decisions will fall on a disproportionately large part of society.

A fundamental question about the WHO is how it prioritises its own actions and interventions. If actions are to be prioritised to promote human health and sustainable development, risks must be evaluated relative to one another. The risks for humans who live in poverty are different, and generally far greater, than those that result from modern technologies. Indeed, modern technologies are essential to economic development and the associated transition from high-risk to low-risk living. It is unclear that global regulatory rules emanating from an organisation in Geneva can possibly take account of the wide disparity in priorities among different nations.

For our children?

In June 2004, the European division of the World Health Organization will convene its Fourth Ministerial Meeting on Environment and Health, a meeting of health and environment ministers from 50+ European countries, including the 25 European Union member

states, as well as Russia, the former CIS nations, and others. Under consideration at this meeting is how to ensure health and a safe environment 'for our children'.

The objective of this meeting is for the 50+ European members of the WHO to adopt special regulations that will ensure that children today and in the future are protected from environmental risks to their health. Yet perhaps the best way to achieve this is to allow economic development to take its course without attempting to interfere unduly through the highly visible hand of the central planners at WHO.

The WHO's European region illustrates well the transition from poverty and pollution to wealth and health. Most of the western European region (the EU-15) consists of wealthy, developed countries which long ago made this transition. People in this part of Europe generally live long lives, benefit from a fully integrated economy and infrastructure, and have few local environmental problems such as air pollution, dirty water, and poor sanitation. This has consequent benefits for human health – people generally live long lives which are increasingly free of hard labour and drudgery.

In contrast, the remaining 37 European WHO nations (including the ten new European Union member states in Eastern Europe) are in an earlier stage of development. They have different priorities and many have yet to make the transition to being technologically sophisticated, fully developed nations. Many of these are former Soviet Union states who continue to suffer from underdevelopment, corruption, and lack of institutions to enable economic growth. They lack basic health facilities, much less the sophisticated medical technologies enjoyed by their western counterparts. Their problems are more basic, including in many places a reliance on solid fuel for heating and energy, with consequent indoor air pollution, and generally a poorer quality of life.

In the case of these remaining 37 countries, it makes little sense to talk about risks from environmental hazards, when there are many more gains to be made from acquiring better technologies, engaging in economic development, and allowing people to shift

their priorities towards the environment. The WHO's role in this is unclear. It tends to focus excessively on the negative health consequences of economic development, rather than broadly encouraging a discussion about why people in wealthier economies are indeed healthier.

Wealthier is healthier, cleaner and greener

Economic development and the associated increases in wealth, enhanced technologies and improved infrastructure have been the primary drivers of the improvement in the lives of children globally. Increased wealth means that can children go to school rather than working on the farm. Improved technologies enable the eradication of water-borne diseases. Improved infrastructure means children can obtain the variety of foods and medicines that will enable them to grow up and live healthy, happy, long lives.

The combination of increased wealth and improved technologies can be a powerful force for environmental improvement. At the turn of the 20th century, British towns were plagued by smogs caused in large part by the burning of coal in relatively simple household fires. Over the course of the following four decades, households gradually – and almost entirely voluntarily – switched to burning 'town gas' in increasingly sophisticated heating systems. The result was a dramatic reduction in pollution and associated ill-health. By the time of the Clean Air Act of 1956, which mandated the replacement of coal fires with gas, electricity or coal, the transition was already well under way.

Indur Goklany, the engineer and historian of technology, describes the transition of wealthy countries during the course of the 20th century eloquently:

> *Prosperity and technology were once responsible for air pollution. Today they are essential for its cleanup. Their transition – from problems to solutions – began toward the latter part of the [nineteenth] century with the emergence of new, clean energy sources*

> *and more efficient combustion technologies, and gathered steam through this century. And through the decades, one by one, the various pollutants were brought under control, each being forced through an environmental transition. As if in accordance with a grand design, the most obvious and the easiest-to-control problems were addressed before others, with each pollutant's transition being determined by factors dependent ultimately on prosperity and technology.*[6]

In a later publication, Goklany broadens the analysis and shows how concern for the environment fits in with other priorities:

> *As a country becomes more economically and technologically developed, in order to improve its quality of life it first addresses immediate needs such as food, running water, basic medical services, electricity and education. Once those needs are met satisfactorily, the country turns its attention to the other determinants of its quality and life, such as air pollution and other environmental matters. Accordingly, it specifies its desires for a clean environment in various policies. Then, greater economic and technological development helps convert those policies into reality. The wealthier a country, the more it can afford to research, develop, and install cleaner or cleanup technologies.*[7]

Indira Gandhi once said that "poverty is the worst polluter". If this is true, and the evidence broadly supports it, then pollution can only be reduced by reducing poverty – in other words by begetting wealth. Or, as another aphorism has it: wealthier is healthier, cleaner and greener. But attempts to shift the priorities of those who are poor – forcing them to place green and clean ahead of wealth and health – are likely to prevent the wealth from being generated in the first place and ultimately will slow down the process by which the poor transition to clean, green riches.

Notes

1 Adapted from: www.ifst.org/no_dhmo.htm
2 See www.dhmo.org
3 For an overview, see the introduction to Morris, J. and Bate, R. (1999) *Fearing Food* (Butterworth-Heinemann).
4 For a more detailed analysis of the issue see: Wilson, J, D. (1997) "Thresholds for Carcinogens: A Review of the Relevant Science and its Implications for Regulatory Policy," in Bate, R. ed. (1997) *What Risk?* (Butterworth-Heinemann).
5 In 1969, Sweden passed its Environmental Protection Act, which reversed the burden of proof for new technologies. It also contained a clause asserting that 'mere risk' may be enough to warrant protective measures. In 1970, Germany passed its Clean Air Act, which introduced the concept of "vorsorgeprinzip", or foresight principle, which was intended to prevent harmful effects. The vorsorgeprinzip presumes that environmental protection is more important than economic development.
6 Goklany, I. (1998) The Environmental Transition to Air Quality" Regulation
7 Goklany, I. (1999). *Clearing the Air: The Real Story of the War on Air Pollution.* Washington, DC: Cato Institute. p.155.