

which are usually much less intensively farmed, and gives poor farmers and landless people the means to grow enough food to feed their families. The World Bank has estimated that such a “patchwork revolution” could increase yields even faster than the Green Revolution, with much more success in reducing hunger.

The solutions of the developed world are more high-tech, particularly the development of genetically-engineered varieties with even higher yields than the newer productive hybrids and with additional features such as pest-resistance and herbicide resistance. While these may help significantly in specific cases, the potential problems of epidemic disease of such monoclonal, the loss of wild diversity upon which new vigor depends and the release of disruptive genes into wild ecosystems and natural varieties remain little-explored problems.

### The Pollution of Gaea

“And I will give it into the hands of the strangers for a prey, and to the wicked of the earth for a spoil; and they shall **pollute** it. My face will I turn also from them, and they shall **pollute** my secret place... Destruction cometh; and they shall seek peace, and there shall be none.” Ezek 7:21

The actions of Saddam Hussein in setting fire to the entire Kuwaiti oil fields during the Gulf war typifies the problem of casual and reckless pollution. However this act pales into relative insignificance by comparison with the multifaceted pollution on a world-wide basis from a diverse spectrum of agents in the name of human progress.



Radioactive contamination of Europe following Chernobyl (p 198).

### Nuclear fallout and radioactive contamination

Nuclear contamination remains perhaps the most apocalyptic of pollutants to capture the human imagination. The devastation wrought on Hiroshima and Nagasaki (p 188) was however only a foretaste of the much larger amounts of

fissile material released into the world environment by atmospheric testing by both the East and West during the military buildup that led to the Cold War. Continuing anxiety has also been expressed about the consequences of embracing nuclear energy. However the anxieties over Three Mile Island proved to be only a minute disruption compared with the events which unfolded in 1986 at Chernobyl (p 198). Nuclear weapons and the contamination caused by plutonium enrichment continue to have a very heavy toll on the environment, with several areas of Russia so heavily contaminated that bats glow in the dark.



Two faces of pollution: Left Gold miners in the Amazon. Mercury has contaminated many jungle waterways. Smokey mountain Manila refuse pollution is almost universal and diverse in toxicity. Plastic are also a problem.

### Chemical pollution

Chemical pollution is as old as human society, illustrated by the lead poisoning hypothesized to be the downfall of the Roman empire, the sooty dark chimneys of Victorian England and the mercury poisoning of Lewis Carroll's mad hatter. However the most notorious cases first recognized on a global basis were halogenated hydrocarbons, especially DDT dichloro-diphenyl-trichloro-ethane and its contamination of whole food chains, spanning the globe from Niagara to Antarctica, alerted to the world in Rachel Carson's "Silent Spring." Similar problems surfaced with the herbicide 2,4,5-T 2,4,5-trichloro-phenoxy-acetic acid and particularly its synthesis contaminant TCDD or 2,3,7,8-tetrachloro-dibenzo-p-dioxin. Particularly pernicious mixtures of high-dioxin 2,4,5-T were sprayed over Vietnam as Agent Orange defoliant, with serious long-lasting effects on exposed humans including birth defects and cancer. A host of other contaminants including heavy metals contaminate whole environments such as the mercury contamination in the Amazon. The developing world is beset by severe pollution problems from the methyl-cyanide eruption at Bhopal to heavy contamination of wells across Bangla-desh with arsenic. The contamination of many rivers with foamy detergent has become legend, but more recently the incidence of a variety of seemingly inert chemicals such as phthalates from the paint and plastic industry have proven to have estrogenic activity and could explain why human sperm counts are falling and why frogs across the world are disappearing in alarming numbers and fish in many rivers have developed male reproductive abnormalities. Much of atmospheric pollution is also chemical including nitrogen and sul-

phur oxides that are killing large continental forest areas with acid rain.

### Genetic Pollution

The newest form of pollution and without doubt the most dangerous is the widespread dissemination of genes from one organism to another through the uncontrolled use of genetic engineering techniques in combination with natural avenues of gene transfer in the wild. Genetically-engineered foods are frequently contaminated with antibiotic resistance genes as markers. The genetic information for antibiotic resistance is thus disseminated across a vast productive area of the planet, where viral exchange could release these factors as infectious agents. Valuable genes, which confer pest resistance in a bacterium or a few species of plant, are likewise transferred ad-hoc to a wide variety of our food plants, where they can cause super-resistant predators and parasites and infertility through damage to pollinating insects. The terminator gene represents the death of the immortal germ line. This gene causes seeds grown after the first generation to become infertile, thus rendering such varieties unable to be grown in perpetuity. In this sense they are no longer living organisms.

Cloning replaces natural biodiversity and the almost infinite variation this implies with a mechanical replicon, carrying lacking the genetic variation for future disease resistance and for sustaining a future world whose conditions may be substantially different from our own. Catastrophe could happen because of natural or astronomical crisis, or the failure of a few germ-plasm banks holding world stocks of the natural varieties or by the contamination of natural varieties. Engineering the human germ line could lead to similar loss of essential characteristics. The biggest danger is that, simply because of the onrush of such technologies, with no proper ethical consideration by the consuming public, we will lose the natural varieties of food species upon which we have always depended for our survival in evolutionary time and become extinct. It is thus our duty to ensure this does not happen and that natural diversity and the continuity of life from one generation to the next is sustained.



Greenpeace' apocalyptic 1997 warning coincides ironically with the three year transformative paradigm of Genesis of Eden and the three year mission in John.