



# What impact will pollution and waste management have on our future?



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DURING the latter half of the 20th century, the Western world was in the grip of a fever. It was a fever to grow, develop, advance, prosper and consume as never before. Described as the Economic Era, from the 1950s to the 1990s, international trade increased by 12 times and global economic output quintupled, with two-and-a-half months' global production in 1990 equalling the production output for the entire year of 1950.

Driven by powerful concepts such as planned obsolescence and the unconstrained consumerism and elevated living standards of a baby-boomer generation, as well as a mindset that viewed environmentally damaging practices as being justifiable in order to drive a world economy that was spiralling ever upward, the Economic Era was a period when progress was defined by the production and consumption of a greater and more diverse range of goods than the world had ever seen before.

This unprecedented pace and scale of global economic growth was powered by an unparalleled consumption of resources such as water, oil, coal, gas, timber, minerals and metals.

Water consumption, for example, increased threefold in the decade from 1950 to 1960 and six times more oil was used than in previous decades. Until the 1950s, fertiliser use had been scant, however, from then it increased exponentially, with one half of all the commercial fertiliser ever produced being applied since 1984. The amount of pesticide sprayed on global crops increased 26 times over the same period.

The result was that between 1950 and 1984, world grain production increased more than two-and-a-half times and between 1950 and 1989 world meat production increased by five times, with world fish catches increasing by more than three-and-a-half times.

Woodfuel consumption as an energy source rose by nearly 80% between 1961 and 1998, with woodfuel production in 1998 totalling 1.8 billion cubic metres. And in terms of global traffic in the 1950s, there were 50 million vehicles on the roads with one car for every 46 people. By the 1990s, this gap had narrowed to one car for every 12 people, with more than 400 million vehicles being driven on the highways and byways of the planet.

The decades of the Economic Era were a time of making more, buying more, consuming more and discarding more in ever-widening circles. Disposable, throwaway, time reducing and labour saving had become powerful marketing bywords across a wide array of products. And a Western value system that was devoted to material acquisition rated these conveniences as having greater importance than the raw materials required to produce them, as food security, water scarcity, deforestation and energy security had yet to become the global spectres that they are now.

What couldn't be used or was no longer wanted was dumped, with nowhere on the planet being sacrosanct. On Mount Everest, known to the Tibetan people as *Chomolungma*, "Goddess Mother of the World", and believed by them to be the closest place on earth to heaven, the rubbish had piled up. And even in Antarctica the icy pristine snowfields had been befouled by human waste.

## The Cold War and weapons disposal

But an over-zealous consumption ethic was not the only culprit in the global pollution debacle. Also to blame was the Cold War between the United States and the former USSR, which began at the end of World War II and ended in December 1991 with the fall of the Soviet Union. Characterised by an ongoing and highly charged state



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**RESOURCE SECURITY:** With overall consumption increasing dramatically, resource security has become a defining concern of our modern time.

of tension between these two superpowers and their respective allies, the Cold War with its massive defence spending led to weapons overkill, with each side throwing massive amounts of resources into the manufacture of combat aircraft, warships, submarines, battle tanks, machine guns, rifles, shells and bullets; stockpiling them against the day when they might be needed in a deadly confrontation.

When the tide of the Cold War with its terrifying prospect of thermonuclear annihilation had turned, some of this ordnance was disposed of by dumping in the ocean. It was also buried on land, detonated or burnt in open-air pits – crude, unimaginative disposal methods that discounted safety and environmental considerations.

During the 1940s, 1950s and decades beyond, nuclear weapons, the Cold War's ultimate deterrents, were extensively tested by military powers as yet not fully cognisant of the effects produced by fallout. Consequently many nuclear devices were exploded on land and under water.

After a spate of such tests on the island of Enewetak, an atoll in the Pacific Ocean, thousands of tons of radioactive soil and debris scraped from testing sites were taken to a small deserted island called Runit Island. There the hot soil and debris were entombed in a huge bomb crater covered over with a thick concrete dome that today gives no hint of the malignant nature of the radioactive garbage that lies buried beneath it.

Human intelligence had been able to conceive of the hydrogen bomb but it was unable to find a way of disposing of its deadly by-products except by the most primitive method of burying in virgin soil.

Since World War II, various governments around the world have amassed a collection of weapons of greater sophistication than has ever been produced before. This collective arsenal of conventional, chemical, biological and nuclear weaponry constitutes a grave threat beyond its lethality because, in terms of military progress, modern weapons today could end up as garbage tomorrow.

## Beyond national boundaries

Pollution takes many forms. It also doesn't recognise national boundaries. In the sea, ocean currents move in great surface spiral patterns known as gyres, sweeping clockwise in the northern hemisphere and counter-clockwise in the southern hemisphere, with currents originating in the northern latitudes eventually arriving in Antarctica. In this way they are a significant transportation medium, circulating chemicals and other matter around the globe.

This oceanic circulatory system is the reason why cholera microbes defecated into the ocean can be transported via algal blooms across thousands of kilometres of open sea, to finally infect people eating contaminated seafood on the other side of the world. It is also the reason why persistent organic pollutants (POPs), chemical substances that accumulate and concentrate up the food chain, have been found in dangerous levels in the Arctic's wildlife, water and snow.

Organisms that live in water are often most strongly affected by pollution because water spreads pollution more easily than happens on land. According to the World Wildlife Fund for Nature (WWF), dioxins, extremely toxic POPs that result from many industrial processes triggering cognitive disorders, suppression of the immune system, reproductive disorders and other problems in both humans and animals, have been found in unacceptably high concentrations in whale and dolphin meat sold in Japan.

Each summer, huge areas covering more than 20 000 square kilometres spread across the Gulf of Mexico, becoming "dead zones". Caused when nitrogen-fertilised algal blooms and other plant matter dies and decays, these areas of water have critically low levels of oxygen, which suffocate marine species, making them uninhabitable.

Deoxygenated dead zones in the Gulf of Mexico result

from severe nitrate pollution caused when floodwater from the Mississippi River flushes nitrogen-rich fertiliser used by farmers in the Mississippi watershed into the sea. However, they are not limited to this region alone. With 405 dead zones recorded in coastal waters worldwide last year, as against 162 in the 1980s, dead zones pose an escalating threat to life in all the world's oceans.

A greater threat, however, lies in the human predilection for living close to the sea. For with two-thirds of the 50 most densely populated cities in the world being coastal cities, contamination from human development is likely to increase.

As with each terrestrial biome on the landmasses of the earth, humankind has made its presence felt in the sea through oil spills, such as that of the Prestige oil tanker which sank near northern Spain in November 2002, spreading deadly black sludge over approximately 3 000 kilometres of coastline, killing an estimated 300 000 seabirds; through tin cans that have been found at ocean depths of 4 000 metres; through plastic bags that have been found floating north of the Arctic Circle and as far south as the Falkland Islands, entangling sea life and killing various species including whales, dolphins, seals and turtles; through garbage swills such as that referred to innocuously as the Pacific Garbage Patch, a 3.5 million-ton stream of trash the size of Texas that floats midway between Hawaii and San Francisco like a gigantic bobbing mat; and through sonar "noise" pollution from military, commercial and recreational vessels that ply the shipping lanes of the world, drowning out the singing of whales and affecting their ability to feed, mate, detect predators and take care of their young.

## Air quality around the world

Just like is happening in the ocean, atmospheric pollution levels are rising all over the planet, especially in many first and third world cities where the ideal of clean,

oxygen-rich air to breathe is becoming a far-off dream.

According to the World Health Organisation (WHO) three million people die each year around the world as a result of pollution from vehicles and industrial emissions.

Of the 20 most polluted cities in the world, 16 are in China, where breakneck economic growth and soaring energy demand are causing severe air pollution problems, costing the Chinese economy, according to the World Bank, 25 million dollars a year in health expenditure and lost labour productivity.

China's air quality problems were recently highlighted during the Olympic Games when efforts were made to clean up Beijing's chronic pollution, an acrid fog of construction dust, vehicle exhaust fumes, and factory and coal-fired power plant emissions, a process that necessitated shutting factories near the capital and keeping nearly half of Beijing's 3.3 million cars off roads weeks prior to the Olympic Games.

In the southern hemisphere the industrialised Highveld of South Africa, one of the largest industrialised economies in the southern African region, is a major source of air pollutants and greenhouse gases, with the air of first-world city, Johannesburg, building to the point where it becomes a noxious gaseous soup, especially during winter months when the air is unmoved by cleansing winds.

This gaseous pall, known as a "brown haze" in Cape Town, is caused primarily by industrial emissions and exhaust fumes. However, much of the air pollution in the southern hemisphere relates to the fact that a large proportion of the world's hundreds of millions of people dependent on firewood for fuel, live south of the equator.

In industrial countries wood energy contributes only about 3% of total energy supply. However, this percentage rises steeply in developing countries, where biomass and wood burning provides approximately 30% of total energy supply.

Africa and Asia use 75% of global woodfuel, with the demand for fuelwood and charcoal in some regions being driven by growing numbers of poor rural people who depend on wood for their cooking and heating needs.

By burning biomass and firewood, oxygen is consumed and smoke and carbon dioxide are released into the atmosphere. Also, the important carbon dioxide fixing capacity of the chopped-down trees is lost. This is a double negative in terms of carbon dioxide and general atmospheric pollution build-up, especially in sub-Saharan countries such as Uganda, Rwanda and Tanzania, where woodfuels are a primary energy source, providing 80% or more of total energy requirements.

Although nitrogen as a basic building block of plant and animal proteins is a nutrient essential to all forms of life, nitrogen overload, caused by the burning of fossil fuels, a massive increase in the use of nitrogen-based fertiliser and a surge of land clearing and deforestation activities, is contributing to serious distortions in the natural nitrogen cycle.

Excess nitrogen causes the release of the nitrogen-containing gases, nitric oxide and nitrous oxide, into the air, with nitric oxide being a potent precursor of smog and acid rain and nitrous oxide being a long-lived greenhouse gas that traps 200 times more heat than carbon dioxide, also playing a role in the depletion of the stratospheric ozone layer.

With human activities now contributing more to the global supply of fixed nitrogen each year than natural processes do, air quality is threatened all over the world, especially in developing countries where both fertiliser use and energy use are growing rapidly.

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