

# Science and the military

and sand that duststorms in the region became ten times more frequent and also much more severe. Also in World War II, in Libya alone, approximately five million mines were deployed, and it took thirty years to clear the land. It is reported that during the Gulf War a greater tonnage of munitions was dropped and fired than during the whole of World War II, and in a much smaller area. The fuel-air explosive bombs used to clear minefields were themselves a 'desert storm', pulverising whatever topsoil existed in the desert and destroying any vegetation present. Clearing the environment of very dangerous unexploded bombs, shells and mines is expected to cost more time and money than the widely reported oil damage.

It has been said that before World War II the only signs of old battlefields were cemeteries and monuments. Since that war, modern science has continued to produce weapons with their own devastating afterlife, whether actually used or not. Nuclear weapons at once spring to mind, but chemical and biological weapons leave their own residue. Gruinard Island, off the north-west coast of Scotland, is infected by anthrax, following an experiment in biological warfare. Drums of various chemical weapons have been dumped off coasts, with no regard to the possibility of corrosion and leakage. The legacy of the defoliant herbicides used in Vietnam is notorious.

Environmental degradation is not the only problem. What of consumption of non-renewable resources? Even before the Gulf War the military were responsible for five per cent of the world's total consumption of petroleum, as well as six per cent of aluminium and eleven per cent of copper. Defence establishments lock away large areas of land; Maralinga is yet to be cleaned up after the British atomic bomb tests, and the beautiful Jervis Bay, recently proclaimed a national park, has to live with Navy designs on the area, including an armaments depot.

Yet, as the environmentally friendly stealth bomber, with its 'green' coatings, demonstrates, weapons scientists

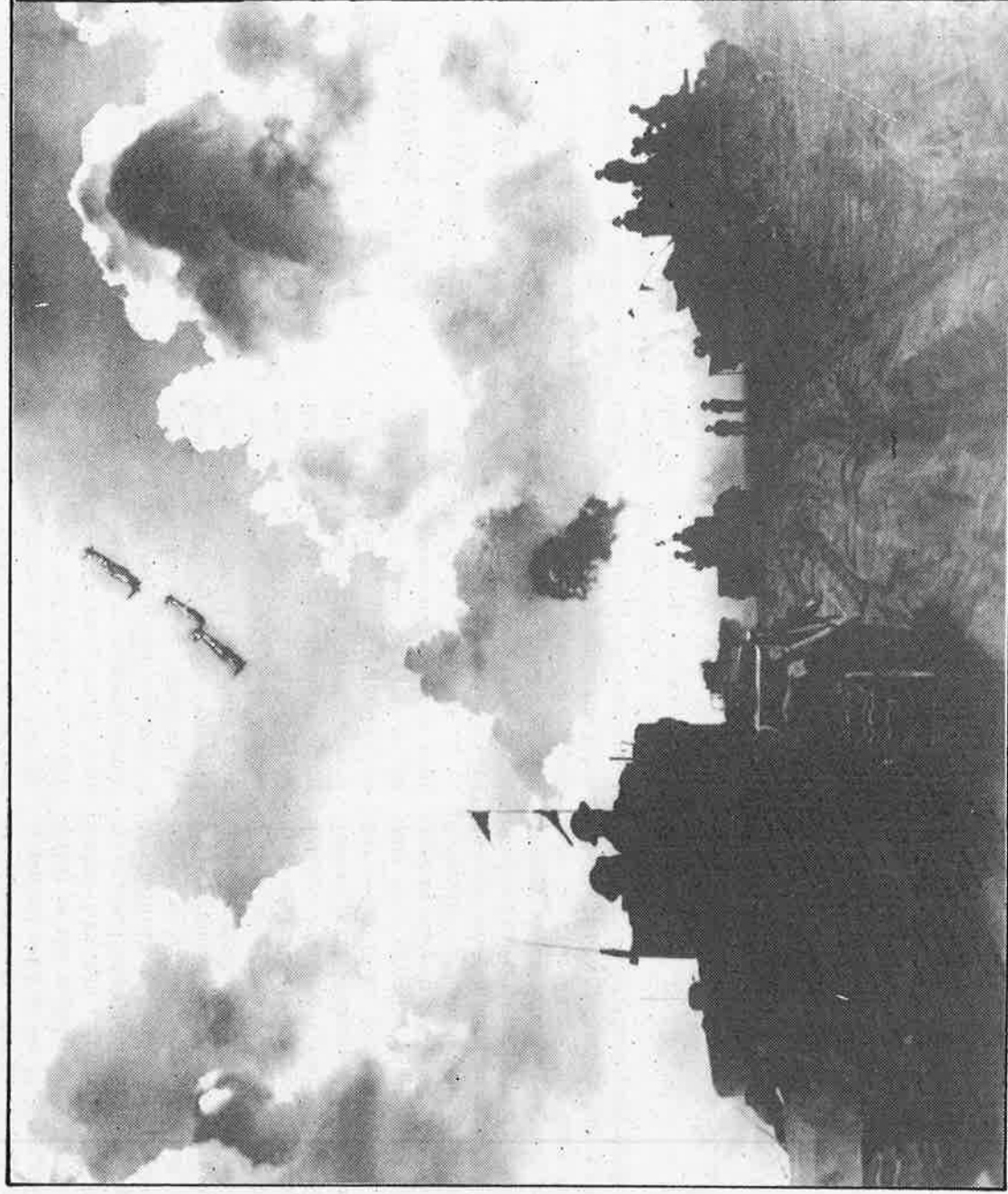
*Wars have devastating impacts on the environment, and even 'peacetime' military activities can be highly damaging. Yet military activity has had a low priority for environmentalists. Mary Cawte looks at where military research and development are leading us.*

**T**HE EFFECT OF WAR on the environment has changed markedly since World War II. And since World War II science and the military have been linked more closely than ever before. The scale and sophistication of military technology are almost impossible to realise, and cannot be set aside while environmentalists study other problems apparently unrelated to war and the arms race. No examination of science and the environment can bypass the military.

Ironically, the military-industrial complex itself is quite willing to climb on any green bandwagon it sights. An advertisement by Deft Coatings in *Aviation Week and Space Technology* featured a picture of the B-2 stealth

bomber with the heading 'Clean Air is an International Responsibility'. Apparently Deft's 'water-borne primers' prevent the release of over a million and a half pounds of solvents into the environment each year. What the bombers could release, or indeed have released, into the environment was not mentioned.

In Iraq, Kuwait and northern Saudi Arabia, the combined effects of the bombardment and the movement of military vehicles will persist for decades. The closest equivalent is the 1942 El Alamein battle in northern Egypt and, according to Dr Arthur Westing, a researcher into the environmental effects of war, the tanks involved in that battle so loosened the topsoil



Tanks waiting to advance on the dawn of the battle of El Alemein, 23 October 1942. (Photographer: Frank Hurley. Reproduced with permission from the National Library of Australia.)

do care about the planet. Any day now, a killer comet may be discovered, on a collision course with Earth, and must be intercepted. If the extinction of the dinosaurs can be attributed to the impact of an enormous asteroid near Mexico 65 million years ago, we certainly don't want the human species to suffer the same fate. At a NASA workshop at the Los Alamos National Laboratory, scientists called for a fleet of over a thousand new missiles armed with the world's entire arsenal of nuclear warheads, to save our fragile home from this cosmic disaster. Edward Teller, 'father' of the hydrogen

bomb and ardent advocate of the neutron bomb, proposed a new super-bomb – so powerful that it could never be detonated on Earth – to intercept such an asteroid. The handful of non-weapons scientists at the workshop, including experts on asteroids and comets, were horrified by such proposals. As Robert Park, Professor of Physics at the University of Maryland, has wryly observed, the Star Warriors propose 'to defend Earth at stupendous cost against an imagined menace that, if it exists at all, might not threaten Earth for millenniums – or thousands of millenniums'.

Don't laugh. The Strategic Defence Initiative spent billions of dollars in pursuit of unbelievable technologies, despite an initial incredulous reaction from the scientific community. Few reputable scientists or military strategists believed that it was feasible to build a leak-proof shield against nuclear attack. Many scientists and universities strenuously opposed the program, but the bureaucracy pulled together a set of projects, slapped security classifications on some existing university defence contracts, and established an office and budget for this massive exercise in 'national security'.

Environmentalists on the whole seem to have a bad attitude to the threat of massive asteroids. They keep on fussing about matters closer to home and complaining not only about defence budgets but also about science policy.

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## *Environmentalists on the whole seem to have a bad attitude to the threat of massive asteroids.*

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The Director of the UN Environment Program once noted: 'In a matter of half an hour the world will spend more on what is euphemistically called "defence" than it will give UNEP in one year'. And this spending includes a large component for research. Global spending on military research and development is approximately one quarter of the global R&D budget, and military research has often been called the oxygen which fuels the arms race. It is claimed that there are almost as many US scientists and engineers working directly or indirectly, on ways to destroy life as there are working to improve it. Certainly the US spends twice as much on military R&D as on research and development devoted to all other social goals.

In 1946 General Eisenhower, Army Chief of Staff, wrote a memorandum to senior officials of the War Department on 'Scientific and Technical Resources as Military Assets' drawing attention to certain 'lessons of the last war' namely the 'invaluable assistance' provided by 'resources in the natural and social sciences' and the need to translate them into a 'peacetime counterpart'. In the same year the Office of Naval Research was established as the first federal agency to contract for basic research, followed by the Army Research Office (1951), the Air Force Office of Scien-

tific Research (1952) and the Defense Advanced Projects Agency (1958). Each of these institutions was empowered to contract work from universities and other research institutions. Other important sources of military R&D funding to academic institutions in USA are the Department of Energy, the National Aeronautics and Space Administration (NASA) and the National Science Foundation. During the Reagan administration, weapons programs accelerated from 38 per cent of the Department of Energy budget to 65 per cent. In the same period, grants for energy conservation and for solar energy fell by about 88 per cent.

The phenomenon is not confined to the US. Throughout the world, almost half a million scientists and engineers are working on military R&D. Australia's Defence Science and Technology Organisation, the second largest research and development organisation in the country, employs 1,000 professional scientists and engineers, and counts the defence forces and also the defence industry as its principal customers.

The costs are far greater than the nominal price tickets on this massive diversion of human and capital resources to the military. There is much talk of 'spin-offs', but Seymour Melman, professor of industrial engineering at Columbia University, and others argue that military design criteria are actually harmful to competence in the civilian industrial sector. Environmental 'spin-offs' could be even more elusive; environmentalists are wary of technical fixes at the best of times. The greatest cost, however, may lie in the skewing of the pursuit of knowledge, that concept so fundamental to scientific rhetoric. When evaluating proposals from university researchers, the military substitutes its own evaluative criteria for the traditional peer review process of the academic community (granted that this has its own shortcomings).

Australia has embarked on 'the largest defence capital investment in Australia's peacetime history' according to the 1987 Defence White Paper. Our new submarines will have 'the most advanced underwater combat systems

in the world', for example. Indonesia, commonly cited as our chief potential threat in the region, has a defence budget less than one quarter of the Australian budget. Indonesian defence expenditure has actually declined sharply in recent years. Of course, as the government argues, the share of our GNP allocated to defence is much lower than in, say, Norway or Sweden. And while most OECD countries are cutting defence budgets, China, Thailand, Taiwan, India, Malaysia and others are increasing theirs. Nevertheless, at a time when superpower and regional tensions and perceived threats are lessening, the Australian Defence Force's strategic modernisation programme is ruled by its own momentum; if the new weapons systems are more capable, argues the government, this does not indicate a new militarism, but is the consequence of technological modernisation.

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## *we have too many of the world's most advanced fighters for our current needs*

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Despite, or because of, modern armaments, there is increasing recognition that there can be no military solutions to most of the world's most intractable security problems. Australia may discover that it has given too much emphasis to military solutions and to high level threats, while disregarding low level contingencies. Thus, argues Andrew Mack in *A New Australian Militarism*: 'we have too many of the world's most advanced fighters for our current needs, but no adequate coastal surveillance system.' If the use of force is becoming ever less practical, argues Mack, we should 'be allocating more resources to non-military approaches to enhance regional and global security'. Yet the ratio of Defence to

Foreign Affairs spending is approximately 20:1, even though the Foreign Minister has described an approach to security requiring 'adequate financial support for non-military instruments'.

The military command over human, scientific and financial resources inevitably tends to favour military approaches to security over non-military ones. But even in World War II, the scientific establishment itself was already selling not only new techniques but also the strategies to go with them. Once again, here are the solutions; where are the problems? Once again, 'because it's there ...' All military technology that can be developed should be developed; otherwise, an enemy will make it and destroy us. This logic leads to escalating arms races and increasing risks of accidental war, and keeps countries in the debt trap. Low income countries, as a group, currently allocate about 20 per cent of their budgets to deadly weapons – modernisation in the name of defence. Nor is the 'one jump ahead' logic exclusive to military-funded research. The economic war also, the threat of international competition, is constantly invoked to justify research and development programs. There is no automatic guarantee that if money could be saved from military research it would be turned to good account for sustainable development, human dignity and the environment.

We live in 'interesting times' as the old curse has it. The collapse of the superpower-based Cold War occurred at the same time as it became less and less possible to ignore a set of unprecedented global challenges. Inevitably there was talk of 'redefining national security' to include 'environmental security' and in the USA a 'strategic environmental initiative' mooted. The chairman of the Armed Services Committee proposed a \$200 million 'Strategic Environmental Research Programme': some data gathered by the armed services and intelligence agencies would be made available to non-military scientists; military aircraft, ships and submarines as well as satellites would collect information on air and water quality and on global climate;

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Some manufacturers of materials used for weapons systems are using the environment as a means of selling their products.

the powerful computers used by the Departments of Defence and Energy would be made available for civilian research. 'Sounds good', according to the Department of Defence. And in fact Congress adopted the proposal, the idea behind which was to combine environmental concerns with the interest of the military in retaining its research and technological capability in a time of shrinking defence budgets.

But what is going on here? Is it a demilitarisation of traditional security thinking, or a militarisation of ecopolitics? Slotting the environment into the national security file may undermine the sense of 'our common future' and of one planet – concepts in desperate need of nurturing.

And what of military research paradigms? Working on large complex weapons systems requires assumptions

quite alien to environmental thinking. For example: my work is a small and circumscribed piece of an enormous system that I do not need to understand; people are sources of unreliability, and their effect should be minimised; uncertainty cannot be tolerated; and so on. And what of research criteria? Green criteria are different from those of the military and often from those of mainstream science also.

The military-scientific complex is not about to wither on the vine. Its roots are firmly in the Baconian revolution, and its growth is rank, its branches tough and thorny. We need to beat swords into pruning hooks, and smartly.

*Mary Cawte tutors in technology and the environment at the University of New South Wales.*