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Dear Professor Garnaut,

Outline of Submission

Under terms of reference 3 and 4:

“3. The role that Australia can play in the development and implementation of effective international policies on climate change; and

“4. In the light of 1 to 3, **recommend medium to long-term policy options for Australia**, and the time path for their implementation which, taking the costs and benefits of domestic and international policies on climate change into account, will produce the best possible outcomes for Australia.”

And also under your consideration of **“policies that mitigate climate change, reduce the costs of adjustment to climate change (including through the acceleration of technological change in supply and use of energy), and reduce any adverse effects of climate change and mitigating policy responses on Australian incomes”**.

I ask you to consider my submission which is in four parts.

1 Scientific literacy and some policy options about how air and other environmental pollution could be reduced with many benefits and little overall pain.

2 My talk **‘Wear-out products, prosperity and environmental degradation’**, broadcast on The ABC’s Radio National, on December 9, 1995 in the Science Unit’s Ockham’s Razor series. Please note its conclusions. The first version of this was co-authored with John Coombs, and published on the Opinion Page in *The Australian* of May 6, 1975. The updated 1995 broadcast version was written by me, after clearance with John and Nugget Coombs for the soundness of its economic aspects.

It is about the deleterious impacts of planned obsolescence, and the subsequent move to wear-out, short-life, and throw-away products. It shows how they have had, and continue to have, many negative effects for the consumer, for the environment, and sometimes for the reputation and success of the businesses that produce them. It finishes thus:

“So I conclude with a plea to those who set the public agenda. Please recognise that our beautiful biosphere can no longer sustain the waste and pollution of wear-out and throw-away products. The price we have already paid is very high”.

Since 1995, it has become even more urgent to recognise and deal with this problem.

3 ‘The Tragedy of the Commons and Sustainable Survival’ is another talk recorded for the ABC Science Unit Ockham’s Razor programme on December 11, 2000. It summarises and updates a classic paper, and begins:

In 1968 the journal Science published an academic address by Garret Hardin called ‘The Tragedy of the Commons’, and it became a classic. It formed the basis for much thinking among social and environmental scientists, especially in relation to the over-exploitation of natural and economic resources, pollution of the environment, and over-population. Yet today, though many problems of sustainable survival are more urgent than in 1968, the operation of this Tragedy is seldom recognised in the lay media, and most people, and more importantly politicians, seem to have no idea what it means.”

As these were recorded before Ockham’s Razor talks were placed on-line, I present them below. They may now also be seen at <http://www.members.optusnet.com.au/pcook62>

4. A note on the background from which this submission arises and my qualifications for offering these views.

Peter S. Cook.

Submission

1 Some ways by which air and other environmental pollution could be reduced with many benefits and little overall pain — a few neglected points on energy saving, and the need for more scientific literacy in pupils on leaving school.

1.1 Avoiding more coal-powered electricity generation by ripple control of peak demand.

Coal-fired power stations cannot quickly adjust their output to diurnal changes in demand like hydro-electric power generators, and politicians respond to actual or anticipated power cuts by promising more coal-fired power stations. For domestic water heating, electricity demand is controlled by the supplier through the ripple-control of hot water heating, with peak, off-peak, and extended off-peak switching and corresponding price incentives.

Some of the peak demand for electricity is for air-conditioning on hot days. In Sydney, for example, on a very hot day, this is much needed in the inland Western suburbs, but nearer to the coast many buildings and shopping malls are often very much cooler than they need to be.

I suggest that the air-conditioning installations of large consumers be required to have their air-conditioning subject to the similar ripple control mechanisms to those that now control peak electricity demand for water-heating. For totally air-conditioned buildings, having windows that do not open, this could mean that outside fresh air is still pumped in, but the cooling (or heating) component could be adjusted to reduce peak demand. It would be better to make such buildings have at least some windows that can open.

I think it was John F. Kennedy who, during some winter fuel crisis, called on Americans to put on a jersey or sweater, and turn their air conditioners down by five degrees (? from 70 to 65 degrees Fahrenheit).

1.2. On excessive use of power from the grid. Over the past 15 years I have sometimes lived near Coffs Harbour, in a place where all the electricity came from solar power, except generators were very occasionally used for special purposes. People in this situation watch their power use carefully, and they soon learn about volts, amps, watts, and amp-hours, and how to reduce any waste of electricity. Unfortunately, the ecological weakness of such stand-alone systems is the limited life and polluting nature of lead-acid batteries, but it shows dramatically how much less electricity you really need to use if it comes from your own solar panels and battery. On return to Sydney, the massive unnecessary use and wastage of electricity is very striking. This means that vast amounts of electricity could be saved with little drop in the standard of living.

On the idea of every house having solar panels to feed electricity back into the grid, the electronics involved are complicated, since 12 or 24 volts from direct current must be converted to alternating current, stepped up in voltage, and then synchronized exactly with that of the grid. It must be inherently expensive for each house to have its own electronic set-up, and unless the components are built to last almost indefinitely, and give long and trouble-free service, I suspect that the net result may be even more to CO₂ and other pollution. It could be valuable for each house to be able to compare how much electricity they generate and use, but unless their systems are durable, I suspect it may be less polluting and more economical to gather solar power in other ways.

1.3 Reducing waste of power by domestic refrigerators.

I suggest measures to encourage all upright refrigerators to be re-designed internally, and built to a 'chest-of-drawers' pattern. The rationale of my suggestion is that a fridge – being a heat-pump – uses electricity to get heat energy out of the fridge and to dissipate that heat from the cooler at the back, so it gets hot.

Whenever the fridge door is opened, since cold air is denser and heavier than warm air, the cold heavier air that is in the 'drawers' tends to stay, but the other cold air that was surrounding other items in the fridge, can move freely, and it literally falls to the ground and the warmed air rapidly comes back to take its place. The electric pump then starts up again to pump it all back to where it was before the

door was opened. The longer the door is open, the more energy is wasted in pumping it all back again. This waste happens every time this type of fridge is opened.

If fridges were so designed that most of their contents could slide forward smoothly in an improved design of 'drawer', as crude ones do at the bottom of a fridge, then, when the door is open, most of the cooled air in all the drawers would stay there; much less cool air would fall out, their contents would gain no heat, thereby saving much electric power at minimal inconvenience.

If you run your food cooling from solar power, or in a camping fridge, you soon learn that, rather than having an upright configuration, it is far more economical of power to have the contents accessible from above. Many domestic freezers were top-opening, as they are in shops for frozen goods.

Incidentally, I am told that, while the use of aluminium instead of copper to manufacture fridge coils saves a few dollars, it often gives the fridge a fatally shorter life and makes it un-repairable. It then becomes polluting junk and, notwithstanding recycling, Sydney is running out of the headwaters of valleys in which to dump it rubbish. (but see below).

1.5. Scientific illiteracy, wasting petrol, and the costly ignorance of basic physics

A little basic physics of everyday life. From my limited inquiries I think many intelligent children are almost completely scientifically illiterate when they leave school. They all know global warming and green-house gases are bad, but they have no idea of the relatively elementary science required to support sensible decisions. How many HSC pupils know the difference between methane, carbon dioxide, oxygen, hydrogen or nitrogen, or for that matter have seen The Periodic Table, or recognise the other elements they encounter in daily life? Or have any idea about the amazing electromagnetic spectrum they all live with, and use in many ways? These are some basic facts of life.

More to the point, they are equally illiterate on energy. How many know anything about electricity — volts, watts, DC or AC, although these are marked on every electrical appliance or gizmo that they buy? Nor have they any idea of what is meant by the kilowatt hours on the power bill that someone has to pay.

Reverse-cycle air-conditioners can be an efficient way of providing heat, but how many understand what it means when quite a small one uses *seven* kilowatts, making space-heating often far more wasteful than local heating as required?

The dangers, waste, pollution and suffering resulting from ignorance of, or disregard for, some inescapable laws of the physics in daily life.

Many pay a heavy price for having no idea of the physics involved in driving a car, or even riding a bicycle. Through ignorance and/or neglect of these facts of life they suffer and cause much costly tragedy and damage — increasing waste, pollution and greenhouse gases at every step of the way.

Some elementary laws in the physics of driving and injury.

For 65 years I have subsidised drivers who ignore the basic sciences involved in driving a car or truck. Registration costs and public liability insurance should be levied on the price of petrol, so it would be proportional to the risk. It should be expensive to *run* a car, but less expensive just to *own* one. Then the families who need a big car for the whole family, could more easily afford a small car if needed for a single person- e.g. for commuting. Cars should also be made durable (see below), with a smaller allowance for depreciation, which encourages waste etc.

Every secondary school pupil who will drive a car should understand the implications of the fact that when they get moving, the *potential energy* which is in the petrol that they have bought is now converted to *KINETIC ENERGY AND THIS INCREASES WITH THE SQUARE OF THE SPEED*, because $KE = \frac{1}{2} \text{mass} \times \text{velocity}^2$. Thus, with increases in speed from 20 – 40 -60 -80 -100 -110 – 120, the Kinetic energy increases in the proportions of:

400 : 1600 : 3600 : 6,400 : 10,000 : 121,000 : 144,000;

i.e. The kinetic energy to be disposed of in order to stop increases in the ratios of 4 to 16 to 36 to 64 to 100 to 121 to 144.

They should know that if they wish stop, all this kinetic energy must go somewhere. If they just stop under control it is wasted as heat and wear and tear. But if they hit a tree, as they often do, it all goes into smashing up the car and its occupants. If they hit a vehicle coming the other way...

They should have some idea about what happens to a brain when a head hits the windscreen. The skull stops more quickly than the softer, more jelly-like brain, thus tearing blood vessels and mashing the brain. Huge amounts of money, healthcare rehabilitation etc etc are incurred through this failure to teach them the real facts of life. They should know that frontal airbags provide no protection against sided impact, and actually, a great deal of head protection is easily available by wearing a crash helmet in a car. This is sure to be ridiculed, as were seat belts, but no racing car driver sets off without one. How is it that they often walk away from high speed crashes, but many young people do not survive much lower-speed impacts?

QUESTACON and SCIENCE ALIVE: There is a need for videos and *Questacon* or *Science Alive* centres to teach the science of everyday life. Christchurch, with a population of about 300,000 people, has a **Science Alive** centre that is much better than anything nearer to Sydney than Canberra. Even at the Questacon, the physics above is not illustrated as it could be.

There should be hands-on, scientific literacy centres — with special reference to travel and energy — designed to help educate young people understand the essential physics of daily life. There should be at least one such centre for each one million people. This would mean four in Sydney: north-east, north-west, southwest and southwest; and so on. Information on *Science Alive* in Christchurch is readily available through Google, and they are keen to help others.

Sony or some such company could devise games, perhaps with some features analogous to those used in pilot training. The machines could award them points for safe driving and economy of energy, while the cost of crashes and various injuries would be debited, and fatalities and some funerals and weeping could follow fatally dangerous driving, ending the game with zero points.

2.1. Wear-out products, prosperity and environmental degradation

Talk by P.S. Cook, as broadcast by the Science Unit of the Australian Broadcasting Corporation in the Ockham's Razor series on ABC Radio National on 9th December 1995 (1835 words):

Every step in the progression from resources in or on the ground until they end up in the rubbish tip, or the ocean requires energy and most of it involves the release of carbon dioxide. The faster this cycle goes, the more CO₂ is produced.

WEAR-OUT PRODUCTS, PROSPERITY AND ENVIRONMENTAL DEGRADATION

Twenty years ago, in May 1975, John Coombs and I wrote an article in The Australian newspaper about wear-out and throw-away products. We discussed their negative effects and offered some remedies. I suggest that today, this is an idea whose time has come.

Amid global concern about environmental pollution and degradation, this is a neglected area where we could increase our prosperity, and at the same time reduce waste, pollution, consumption of energy, and a number of economic problems, including foreign debt. To some extent we could have our cake and eat it too.

Over the years, when I have found myself having to fix or replace something, - costing money that I would rather have spent on something else, - I've remembered a book called "The Waste Makers", by Vance Packard. He said, then, - (it was a long time ago) - that it would only cost an American car maker another five cents to put a durable, long-life, muffler on a new car instead of the standard one which soon rusted out. The principle stuck in my mind - and perhaps it will stay in yours. My memory of it gets renewed when bits of my car, like batteries, tyres, radiators, and exhaust systems perish at an early age; or parts with sealed bearings, like alternators, blow up for want of a bit of grease. While it can be fun buying new things, I like to be free to choose. I don't think most people get a kick out of replacing parts of their motor cars or other gadgets.

So, being an environmentalist who likes things well-engineered, when something needed repairing I would ask the serviceman - (and they were all men) - whether the item involved was well-designed for a long life. I was told that many washing machines were hardly worth repairing after five years, and that high pressure hot water cylinders were carefully designed to need replacing after a limited period, around seven years. Then the insurance company will pay for new carpets, as if it was an accident.

In the 1970s, behind a large Sydney hospital, I found a huge pile of old air-conditioners. The engineer told me that after five years they weren't worth repairing. I was appalled.

Then I saw a technical book, showing how vast amounts of electricity could be saved if heat pumps, in the form of reverse-cycle air-conditioners, were used for heating instead of electric radiators. Generating electricity from fossil fuels is a major source of the greenhouse gas carbon dioxide. But if the air-conditioners have to be replaced every five years, it involves extra cost and pollution, and spoils any gains in this proposal.

I realised that the American company General Motors, which had pioneered planned obsolescence in motor cars, also made air conditioners and refrigerators.

Refrigerators were once built to last, but I was told that some refrigerators could have a short life. When corrosion occurred in pipes embedded deep in the structure, the fridge was not worth repairing. This happened because the pipes were made of a cheap aluminium alloy instead of copper. When I had a fridge with this fatal problem, I rang the Australian manufacturer, and I was told that it would cost too much to make these pipes from copper, although it would have a much longer life. I find this odd, because I can still buy scrap copper pipes for about three dollars a kilogram. Replacing refrigerators has quite an environmental impact, and if most homes in China and India get short-life fridges, the impact will be massive.

As alarm grew about destruction of the ozone layer, due to escape of CFC gases from refrigerators, I wondered how much of this damage might never have occurred, if refrigerators and air-conditioners had been engineered to last, so that the gases did not escape.

In recent years there have been improvements, but in general, the design life of many products seems to be adjusted to be the shortest that the market will stand without stimulating buyer resistance. We are not encouraged to look far ahead, and the market does not care about the biosphere.

By "Wear out " or "throw away" products I mean manufactured goods with a relatively short life, due to planned obsolescence, wear-out or throw-away design, poor workmanship, or unavailability of spare parts.

There isn't time to look at many examples of throw-away products, but you can make your own list. They range from packaging and ball-point pens - to disposable nappies and hospital equipment.

What are the negative effects of wear-out products on the economy, the consumer and the environment?

As far as the economy is concerned, Wear-out products are sometimes defended by saying that they create employment. We hear a lot about increased productivity, but, so far as national wealth is concerned, increased productivity is meaningless unless the product is durable. Wear-out products erode the value of higher productivity.

How many of the shiploads of goods, which clog roads in huge trucks, will be cluttering our garbage tips within ten years, or much less?

Like many countries, Australia has gone far into debt to buy imported goods, and to pay for them we live off our capital, selling many irreplaceable assets, such as industries, forests and, effectively, our precious topsoil.

Sometimes economists talk as if the faster things fall apart the better. If all our manufactured goods failed twice as quickly, this would, other things being equal, increase business turn-over, employment, wages, government taxes, and the "Gross Domestic Product". The usual figures would indicate great "growth" in the economy. But many forms of waste, even road accidents, crime and warfare, can push up the Gross Domestic Product. While some people profit, for us as a nation the prosperity would be illusory, unless all these wear-out products were exported for some one else to worry about.

The consumers who bought them would have to run harder - just to stay in the same place. The world has gone further down this path to absurdity than is generally realized. High tax-depreciation allowances seem adjusted to encourage the throw-away mentality.

For the consumer it is a different story.

Firstly, wear-out products make unnecessary work, and then waste it, tending to cancel out the value of the labour which has paid for them. We have seen how this means that the consumer has to run faster to stay in the same place - the rat-race. You wouldn't build your own house, intending it to fall apart quickly, just to create employment. Yet many people accept the idea of wear-out products because they create work, - as if work were an end in itself, rather than a means to an end.

Secondly, they reduce your choices about how you spend your money. If you have to spend money replacing necessities, you have less left for luxuries or other things you would prefer to buy. Also, they reduce the trade-in value of goods. Your car, or anything else, has better value as a trade-in if it was quality-built for a long life.

Thirdly, wear-out products can be inflationary. If you have to pay for two washing machines to do the work that used to be done by one, this increases the cost, and is therefore inflationary. So, fourthly, wear-out products undermine the standard of living, particularly for older people and those on lower incomes or struggling to raise a family. Durability is essential for any hedge against inflation.

For the environment, the world-wide impacts of wear-out and throw-away products are entirely negative.

In a nutshell, they speed up the conversion of resources into garbage and other pollution. While the planet is crying out for us to slow the process down, wear-out and throw-away products actually speed up the ways that we turn valuable resources into garbage. If we follow the steps by which this occurs, we see that they waste raw materials and energy; they waste labour, equipment, and capital; they waste transport and servicing facilities; and finally, they waste facilities for garbage recycling and disposal. At each step they create waste and pollution. Whenever electricity, or any other energy, derived from fossil fuels is used, the greenhouse gas carbon dioxide is one of the by-products.

In an era when global pollution, greenhouse gases and environmental degradation are threatening reduced standards of living, and the health of the planet, it is remarkable that environmental organisations and the powers-that-be have largely ignored the ways we could, to some extent, both have our cake and eat it too.

You may have heard the slogan "Reuse, recycle and reduce". We hear a lot about "re-use" and "recycle", but not much about "reduce" and how to do it. Yet, there are many ways in which we, and the other powers that be, between us could do something about wear-out products.

We can:

- decide now to reduce this form of waste, and ask the best engineers to help us do it;
- develop standards of design for long life, as an aspect of quality;
- announce national policies of purchasing durable, long-life goods, and avoiding throw-away products;
- encourage our industries to gain reputations for durability as an element in quality manufacturing;
- amend tax depreciation schedules accordingly;
- require spare parts to be available for the long life of the product;
- educate our children to appreciate the science and principles involved,
- ask consumer reports to examine design for durability.
- discourage single-use, so-called disposable items.

Hospitals, which now throw out mountains of equipment after a single use, can change to re-useable equipment, and, at the same time, make good savings in cash, worker satisfaction and environmental impact. [Full details were given on Radio National's environment program and can be got from "Nursing the Environment", care of The Australian Nursing Federation, phone (03) 482 2722.]

To the extent that necessary work is reduced, it could be shared through work-sharing and part-time work arrangements.

Countries which have built a reputation for making things that last, such as Sweden, Germany and Switzerland and in some respects Japan, have prospered with high standards of living. Unfortunately for us this has raised the value of their currencies, making their goods expensive for us, but it benefits their own citizens, and such policies could benefit ours.

In 1975 we quoted an advertisement by Hitachi, saying, "Do everything possible to make everything with longer lasting value". Hitachi is now the world's sixth largest corporation, producing an extraordinary range of products. I would like to see more companies advertising such a policy of value

through durability. A similar slogan, promoted by Rotary, was "Do it once and do it right". It can pay high dividends.

Some years ago the French Government announced a war on wear-out products. It can be done.

So I conclude with a plea to those who set the public agenda. Please recognise that our beautiful biosphere can no longer sustain the waste and pollution of wear-out and throw-away products. The price we have already paid is very high.

2.2 [Update Note: In the case for the deep dredging of Port Philip Bay to give access to Melbourne port it was recently argued that it was essential to do this *because they had to be prepared for THREE times as many cargo ships as come at present.*

Question: Has anyone ever calculated how much of the non-food or fuel goods in these ships will still be of any use after say 2, 5 or 10 years? And where will all the garbage go?

3.1 The Tragedy of the Commons and Sustainable Survival.

In 1968 the journal *Science* published an academic address by Garret Hardin called "**The Tragedy of the Commons**", and it became a classic. It formed the basis for much thinking among social and environmental scientists, especially in relation to the over-exploitation of natural and economic resources, pollution of the environment, and over-population. Yet today, though many problems of sustainable survival are more urgent than in 1968, the operation of this Tragedy is seldom recognised in the lay media, and most people, and more importantly politicians, seem to have no idea what it means.

The "commons" is a metaphor for any collectively-owned and jointly managed asset. The Tragedy unfolds when single people or groups profit greatly by exploiting this resource, while the loss is shared between many others, so that to each of them the loss seems negligible.

Hardin illustrated the Tragedy with a parable. Imagine a pasture - traditionally known as a common or commons - on which herdsmen can graze their animals. Each grazes as many as he can, and this is sustainable so long as the number of men and animals is kept below the carrying capacity of the land, as by disease, poaching or war. But when these constraints are removed, numbers can increase and the logic of the commons generates tragedy unless steps are taken to prevent it.

So, if the land can carry one hundred sheep, ten herdsmen can have ten animals each, and this is sustainable. But now one of them decides to add one more animal, so making about ten percent more profit. The loss in feed for each individual sheep through grazing this one extra animal is only about 1%, and since this loss is shared between all ten herdsmen, it is so small that they don't object. Being rational, our herdsman decides to add another animal ... and another. The other herdsmen, seeing this, decide to do likewise and soon, through free access to the commons, it is overgrazed and ruined.

In an oft-quoted passage, Hardin said: "Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit - in a world that is limited. Ruin is the destination to which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all". Others have commented that this is not quite what happens. "Freedom in a commons only brings ruin to the commons", while those who exploit it get rich and move on. The ruin for all comes later. Hardin argued that in a democratic situation, restraint by "mutual coercion, mutually agreed upon" is the best way to prevent the Tragedy.

Let's see now how the Tragedy can operate in areas such as ocean resources, over-population, environmental degradation, pollution, and economics.

Ocean resources

Hardin lamented the reluctance to acknowledge that the oceans of the world are subject to the Tragedy of the Commons. He said that, while professing to believe in the "freedom of the seas", the maritime nations bring species after species of fishes and whales closer to extinction. Despite efforts in the intervening years, it will need much more international collaboration to stop the Tragedy running its course, as catches are depleted and breeding stocks of fish, turtles and other sea-foods are threatened with collapse. In traditional societies, mutually agreed coercion worked sustainably in

well-defined areas, but on the high seas fishermen may see no point in throwing back undersized fish or breeding stock if other fishermen will come along and take them anyway.

Hardin said that, to make progress, we must exercise the spirit of Adam Smith, with his doctrine that an individual who "intends only his own gain" is, as it were, "led by an invisible hand to promote ... the public interest". The Tragedy of the Commons exposes the fallacy that decisions reached individually will also be the best decisions for an entire society - an idea underpinning much economic argument.

Over-population

"Exploring new ethics for survival" was an important theme in Hardin's writing. His original essay was subtitled "The population problem has no technical solution; it requires a fundamental extension in morality". Applying this to the population explosion, he concluded that if Adam Smith's assumption were correct, it would justify the continuance of laissez-faire in reproduction, and men and women would naturally control their individual fertility to produce the optimum population. But he said that if Adam Smith's assumption is not correct, then we need to examine our individual freedoms to see which ones are defensible. As Jarred Diamond has shown, a civilisation may cause much environmental degradation with destruction of its resource base and extinction of species before its own population collapse occurs. We are now causing the greatest species extinction since the demise of the dinosaurs.

With respect to the freedom to breed, Hardin argued that The Universal Declaration of Human Rights is fatally flawed in declaring that "any choice and decision with regard to the size of the family must irrevocably rest with the family itself, and cannot be made by anyone else". He said that painful though it may be, "If we love the truth we must openly deny the validity of this Declaration, even though it is promoted by the United Nations". He argued that to couple the concept of freedom to breed with the belief that everyone born has an equal right to the commons is to lock the world into a tragic course of action, and we cannot control the breeding of humans in the long run by appeals to conscience. As human populations increase, individuals locked into the logic of the commons through unrestricted freedom to breed, are free only to bring on universal ruin, unless they accept the necessity of mutual coercion, mutually agreed upon, and by this they become free to pursue other goals. The only way we can preserve and nurture other and more precious freedoms is by relinquishing freedom to breed. Only so can we put an end to this aspect of the Tragedy of the Commons. Today, some religious authorities still denounce most methods of birth control as inherently evil. But if this dogma leads to human disasters and planetary degradation, wherein is the greater evil?

Environmental degradation - loss of biodiversity

The Tragedy of the Commons, in various guises, underlies much of the degradation of our forests, soils, rivers, wetlands, coral reefs and oceans, with massive losses of biodiversity of native flora and fauna. In each particular instance, the gain to the exploiter is much greater than any individual's share of the loss. The problem of sharing but not polluting a common resource is urgent in our mis-use of rivers, estuaries and artesian water reserves.

Many traditional societies regulated their commons sustainably, but when this failed privatization of the Commons was sometimes a solution, assuming that an individual owner would take the long view and use it sustainably. Yet privatization to corporate bodies which aim to maximise short-term profits makes the problem worse, and legal entities such as companies do not feel the loss at all. Only when disaster looms will Governments act, but State ownership, too, can fail when rights are conferred for private exploitation.

Pollution

The Tragedy applies in a reverse way with global pollution. Here it is not a matter of taking something out of the commons, but of putting pollution in. Sewage, chemical, and radioactive wastes are put into soil or water, and noxious fumes, or gases such as carbon dioxide, are dumped into the atmosphere. Again, the so-called "rational man" sees that his share in the costs of the pollution he creates is much less than it would cost him to rectify the problem. Since this is true for everyone, we are locked into a system of "fouling our own nest" so long as we behave only as independent, rational free-enterprisers.

The air and seas around us cannot be fenced off, so the Tragedy of the Commons as a sink or cesspool has been approached by other means - like laws or taxes which make it cheaper for the

polluter to treat his pollutants than to discharge them untreated. The "greenhouse effect" and the ozone hole are global Tragedies of the Commons. Like so many other problems, pollution is a consequence of large population. It didn't matter how a few isolated people disposed of their waste.

In December 1995 I spoke on the Australian Broadcasting Corporation's science program about some impacts of wear-out and throw-away products. In January 1999 a report in the Sydney Morning Herald said the disposable car is now a reality. After the warranty expires in some small imported cars, it costs more to replace parts such as a gearbox than the whole car will be worth when it's repaired, so it is cheaper for the owner to throw it away. But there was no acknowledgment of the planetary cost of everyone doing this, and no outrage or protest followed. That shiploads of wear-out products are silently polluting and degrading our planetary environment is a major Tragedy of our Commons.

Economics

The principle of the Tragedy was originally described in 1833 by a mathematician, William Lloyd. Applying it to the jobs market, he saw the pool of available work and the money available from it as a commons. To get it, men who were desperate to feed their families would each bid down the price of labour below a living wage rather than starve, and in the process reduce the total pool of wages available. Perhaps this is now happening internationally in some poorer countries. Within Western societies, trade unions historically emerged to counter this threat, but unfortunately they can generate their own Tragedy. In some ways an economy is like a commons. Unless a wage increase is matched by increased productivity, a wage increase for one union corresponds to a herdsman having more sheep. The gain to each member of that union is much greater than any single person's loss as their share of the cost. The wage increase has a small inflationary effect, which is spread through the whole community. If other groups strike to keep up with the "pace-setters", the Tragedy of the Commons can operate, as we saw with inflation in the 1970's. In the 1980's the Australian Government's "Accord" with the trade unions to achieve wage restraint was an example of controlling the Tragedy of inflation by "mutual coercion, mutually agreed upon".

Since Hardin put the Tragedy on the agenda in 1968, various social and political movements have tried to exert pressure to maintain the Commons. But our planet has three or four times as many people as when I was a boy and much of our globe is still a Commons exposed to this Tragedy. Many animals which were then fairly numerous, such as tigers and some great apes, are now in danger of extinction. Once you grasp the principles I think you may find that recognising this process sheds light on many current affairs. To safeguard the health of our earth, and indeed the future of our species, it is essential that we recognise far more widely the Tragedies which are threatening our Commons.

References:

- 1 Hardin, G. (1968). The tragedy of the commons. *Science*, 162: 1243-1248.
(The full text can readily be found on the internet.)
- 2 Hardin, G. (1972). *Exploring new ethics for survival: the voyage of the spaceship Beagle*. Penguin, Baltimore. (First published by Viking Press 1968.)
- 3 Lloyd, W.F., (1833) *Two lectures on the checks to population*. Oxford University Press, Oxford. Reprinted in part in Hardin G. (1964) *Population, evolution, and birth control*. Freeman, San Francisco.

3.2 Updating Hardin's identification of population increase as a tragedy of the commons.

One "Elephant in the Room"

The Population Bomb by Paul Ehrlich was widely derided some years ago, as were his words that "whatever you cause may be, it is a lost cause unless world population is controlled.

Population control has now become an almost unmentionable subject. In *the Australian* of March 28, 2008, in an article "Be Prepared", it is stated that "by 2020, the UN estimates that Indonesia's population will have ballooned to 296 million, China will have 1.52 billion people and India an astonishing 1.66 billion." Africa and Latin America are not mentioned.

In the 1930s I think I learned that India (which then included Bangladesh and Pakistan) had 250 million people, while China has 400 million people.

A few years ago, against the advice of the Report of the expert Roman Catholic advisory group, a papal decision was made to require very strict restrictions on effective birth control. Some time later, at an international conference in Egypt, on population control, the Roman Catholic Church joined forces with Muslim representatives, to defeat any international action on this momentous matter.

It appears that these actions have rendered it inexpedient for any Western leader or politician to raise the subject as a matter of policy, so it has inhibited much action or advocacy on this vital matter. I suggest the time has come to ask His Holiness to seek up-dated advice, and reconsider, in view of the problems looming for humanity and the biosphere if the previous papal decision remains unchallenged.

4. A note on the background from which this submission arises and my qualifications for offering these views

As a retired doctor and psychiatrist, memory and interest in nature and how things work extend back to before the Second World War. Since that war ended, despite vast and exciting advances in human knowledge and technology, there has been massive planetary degradation – in many cases vastly more than need have occurred for human well-being.

The earth's surface has been widely over-exploited and often trashed. I know little economics but I think there must be some major flaws in economic theory that have allowed this short-sighted damage to occur. Robert Kennedy said that GDP "does not capture the health of our children, the quality of their education, or the joy of their play – it measures everything, in short, except that which makes life worthwhile".

Of course, many more people get health care etc. etc., and I am old enough to remember the horrors of such diseases as poliomyelitis, tuberculosis that was until recently well-controlled — and how life changed as penicillin started to become available. I appreciate the advances like anyone else.

But when I was born the biosphere and the natural world were, in almost every way, in incomparably better condition than they are today; even a Tasmanian tiger was still alive. Since then, many creatures have become extinct, and others are increasingly driven to the brink of extinction. And what have we got to show for it?

Despite the ravages of two world wars In 1945, I believe that the biosphere was in very many ways in better shape in 1945 than it is now. The oceans, coral reefs, fisheries, forests, lakes, and their wild life were in flourishing condition compared with the state of the planet as it has been degraded since world-war II — in the quest for "economic growth" which is calculated in ways that have excluded "externalities" such environmental costs and healthy early nurture of our infants.

Along with chains saws, bull-dozers, and ever-more efficient ways of pulping forests and catching fish and whales, there has been a vast amount of unnecessary destruction; waste pollution has reached a point where human life itself may be threatened in the competition for resources and for some the desire to bring about the end of the world in the hope of a better one in the sky. Highly paid scientists even talk of the need for humans to colonise some other planet, and a future in which everyone can experience a flight in space. Such madness aggravates the despoliation of the planet, while many natural treasures have been unnecessarily lost.

I suggest that all these areas can come within the remit of "global warming" and reducing atmospheric pollution. The logic of Tragedy of the Commons requires that ordinary people have a better understanding of the science involved and how each one can make a difference. A recent letter to *The Australian* pointed out that although Australia's Eastern electricity grid extends from Queensland Tasmania, even switching on one light requires a response that involves the whole system, however small it may seem.