

Katharine Betts, 'The global population', *The Australian Rationalist*, vol. 6, no. 1991, pp. 13-16

An environmental crisis is pressing on the earth and its people. We are facing soil erosion, soil degradation, deforestation, pollution, and atmospheric change. These problems bear on us all but some suffer more than others.

By the late 1980s, around 10 million people had been forced to leave their land and their homes because pollution or loss of topsoil threatened them with poisoning or starvation. They are environmental refugees. Their numbers now rival those of political refugees and seem bound to increase in the 1990s, especially if global warming leads to rising sea levels.¹

The causes of the crisis are twofold: misuse of resources and over-population. Each person contributes to the problem and the number of people multiplies the effect. The way we live now cannot be sustained. Human society must change if acceptable living standards are to be achieved for those who do not already enjoy them, or salvaged for those who do. Perhaps the very best that can be expected will be less than acceptable.

Environmental decay has biological, chemical, and climatic aspects, but its core is social. Human behaviour has caused it and only changes in human behaviour can resolve it.

Many thoughtful men and women fear that their societies will be unable to make these changes and that failure will mean mass starvation, disease and misery. They know what should be done to avert this dreadful future but they also know the strength of the social forces that block the way. They are pessimists.

There are other thoughtful people who are more optimistic, arguing that human beings have met many crises before and have solved them. Each generation has had its Cassandras who claimed that the current emergency was greater than any that had yet been faced. But human society has survived and stands today as living evidence of the failure of prophecy.

The optimists have a point. Countless wars, plagues and famines lie behind us, and yet we are still here, many of us better off than we have ever been before.

But the pessimists are also right when they say that the current crisis is of a different order. Over the centuries tribes have perished and empires have fallen, but human society has persisted. Now, if the worst should happen, climatic change and global war could bring us to the last catastrophe and the end of optimism.

If we accept the pessimists' interpretation what action should we take? Some have decided to do nothing. The problem is too vast; it cannot be resolved because the social forces that have brought us to this juncture are too powerful.

People who feel this way will live out the last part of history quietly and well, turning down the thermostat, recycling newspapers and planting trees where they can. They know that these actions are inadequate but this is all that they believe they can do. At least they will go out honourably.

Others take a different line. They are pessimists when they look at where we are going, but optimists because they believe that we can change our direction.

Today I hope we will be talking about some of the actions that can be taken, because if we were defeatists we would not be here. But before I make my contribution to policy ideas I want to spend some time outlining the background to the current crisis, especially insofar as it concerns global population growth.

Environmental decay as unintended consequence

The first point to bring into focus is that environmental decay has not been planned by anyone. It is an unintended consequence of other things that we do

Most of the people alive today are neither optimists nor pessimists. They have little time to think about large questions of public policy because the daily problems of private life demand their full attention.

In the world of Adam Smith their limited horizons and private preoccupations had benign effects. There was no need to worry about public policy in the world that Smith imagined. Private people should be left alone to pursue their private goals.

If this were done the invisible hand of the market place would, without planning or direction, maximise the common good. We know now that this analysis is inadequate.

These private people have become passive players in a game ruled by fate where the unintended consequences of their actions lead not to the common good but to misery. They must become public people who take control of the game and change it.

In this game as it is now working itself out, there are two sets of players, the rich and the poor.

For one group there are the consequences of decisions to work harder in order to meet the rising cost of housing, commuting, education, and of acquiring credentials in a job market that grows tougher all the time.² Anxiety over the children's schooling rises, second incomes become essential, and the household's work load increases.

To cut down on stress people run another car, install more labour saving devices, buy more highly processed packaged food, disposable plates, cups, and cutlery and, when possible, travel as far as they can to get away from it all.

For the other group there are the consequences of deciding to have another child, or to raise more crops from the same land, or to extend cultivation into new and more marginal areas and, when opportunity fails, to move to the cities and beyond.

Certainly there are lazy and amoral individuals who wantonly consume far more than their fair share of the earth's resources. There are also people who unscrupulously add to our predicament by marketing dangerous products, evading pollution controls and dumping toxic wastes.

But most of the people in the rich and the poor countries who are helping to produce the current crisis are not like this. They work hard, sometimes desperately hard, for their children and their families.

By any standard of conventional morals they are good people. But their hard work and their virtue only serve to bring catastrophe close. Left to itself the invisible hand will bring us the final market failure.

Population growth

The Earth is so old that its age defeats us. Four and a half billion years is too vast a span for the imagination.

Children's picture books on evolution, which begin with the Precambrian and take us through to the near present, show us long stretches of rock, water, volcanoes, and storms. Then there are panoramas of algae, fish, ferns, flowers, dinosaurs and mammals and, as a last flicker on the final page, a human family huddled in modest furs beside their cave.

In this context we are very recent. But, in the context of an individual's life, or even in terms of the time span since the earliest known written records from the Egyptian Old Kingdom, five thousand years ago, we have been here for a long time.

Creatures somewhat like human beings, the Australopithecines, appeared on Earth about four million years ago.

By 100 000 years ago our immediate ancestors, *Homo sapiens*, were well established and perhaps there were about 1.7 million of them.³ First there was *Homo sapiens neanderthalensis* and then, perhaps 40 000 years ago, *Homo sapiens sapiens*, people indistinguishable from ourselves.

By 10 000 B.C. the total human population of the world may have reached four million, about the present population of Victoria. Today we are more than thirteen hundred Victorias and most of this growth has occurred quite recently.

Thinking in terms of adding billions provides some idea of the extent, and pace, of change. The human race did not reach the total of one billion until around 1800.

By 1927, 127 years later, the second billion had been added. The third billion came 33 years later in 1960, the fourth 14 years later in 1974, and the fifth billion 13 years later in 1987.⁴ The sixth may be added in 1999.

The demographic transition

Substantial growth is only a feature of the last 250 years, and most especially of the last 50 years.

It began in Europe, and in European settlements overseas, but the greater part of it has occurred after the 1920s and especially since the last War, when non-European societies began to experience the same kind of demographic changes that had transformed the west.⁵

What are the causes of this growth? This is a complex question but the immediate answer to it is simple.

By and large and for the most part growth has been caused by a decline in death rates. It is only marginally a consequence of more babies being born per couple; it is very much a consequence of fewer people dying, especially fewer babies, children, and young adults.

In the past, birth rates were quite high but high death rates kept numbers in balance. Around 1750 death rates in Europe began to fall and, in the twentieth century, this process was echoed throughout the world. The consequence has been an explosive growth in the numbers of human beings.

In some areas birth rates have now fallen as well, so that deaths once again balance births and, though the population is now much larger than it was before, numbers have stabilized.

In many other areas birth rates have begun to drop but are not yet as low as deaths. In other areas again there has been little change in birth rates; death rates have fallen but the birth rate remains high and the rate of growth is very steep.

Most of the countries with relatively stable populations are in Europe, the area where growth began.

When a society has passed from high death rates and high birth rates to an entirely new situation where its people experience low death rates and low birth rates it is said to have passed through the 'demographic transition'.

The demographic transition can be thought of as having three stages. The first is the pre-transition stage of high mortality and high fertility. The population does not grow and its age structure is youthful because many children are born and few of them live to grow old. In the second, the in-transition stage, mortality drops but fertility remains high. The population grows but its age structure is still youthful because of the high birth rate. In

the third, the post-transition stage, fertility has fallen to match the lower mortality and the population again stabilizes, though at an increased size, and its age structure is older because almost all infants survive to adulthood and maturity.

This phrase “demographic transition” provides a neat label for one of the most important changes in human history but it offers no explanation for why the change occurred.

The fall in death rates in the west was undoubtedly brought about by the industrial revolution and economic growth. Better transport meant more reliable and more varied food supplies and, later, improvements in drainage and cleaner water raised the level of public health.

Developments in curative medicine were unlikely to have had any marked effect before the twentieth century. It has been claimed that it was not until 1912 that a “random patient with a random disease consulting a random doctor had a better than 50/50 chance of benefiting from the encounter”.⁶

But, if supplies of food and water improve and people acquire an understanding of hygiene, death rates will fall.

The course of events in the developing world was a little different. Death rates decreased because public health measures and curative medicine were imported from the west.

For these societies falling death rates were a consequence, not of local economic growth, but of imported knowledge and medical supplies.⁷ And the drop in death rates happened much faster than in the west.

It took western countries about 200 years to increase their average life span from thirty to sixty; the same drop in mortality has been achieved in some developing countries (eg Sri Lanka and Taiwan) in 20 years.⁸

Why do birth rates fall?

Almost everyone wishes to avoid an early death and feels grief when they lose people close to them, so death rates will come down when people have access to the means of death control and populations will move into the second stage of the transition.

It is harder to see why birth rates should come down. There is no easy association between an availability of the means of birth control and a decrease in births.

Many people desire large families because these are customary in their culture and because those who have small families may suffer real material loss compared to people with large families.⁹

So birth control will not decrease births where parents want to have many children. But it is too easy to assume that everyone does have access to effective techniques, and it is not true to say that all births are wanted births.

During the last 15 years there has been massive research into family size preferences in the developing countries, and we now know that 26 per cent of births would have been avoided in these countries if people had had access to birth control.¹⁰

But, the same research showed that many couples do want four, five or six children. If they had access to modern methods of birth control they might avoid the seventh, eighth or ninth birth but they would still have far more the average 2.1 children required for replacement.

On the other hand, birth rates in Europe fell long before the development of modern contraceptives.

The decline began in France in the late eighteenth century and, by the end of the nineteenth century, all of the populations in this group of countries had entered the third stage of the transition. But there is considerable debate about why this change should have occurred.

Birth control, in the form of the traditional methods of abstinence, *coitus interruptus* and unskilled abortion, is always available.

The first two methods require no equipment and can be used by any couple who have a little physiological knowledge and the will to put it into practice. These traditional methods, together with infanticide, help explain the fertility decline in western countries before modern methods were available.

But traditional methods can be unpleasant, painful and dangerous. People need great motivation to use them. If these methods are all that are available the move into the third stage of the transition requires a strong change in attitudes. And this is what must have happened in the west.

A number of scholars have tried to explain this strong shift in attitudes in terms of the social changes brought about by the industrial revolution. If economic growth was associated with a decline in deaths, could it not also be seen as an eventual cause of a decline in births?

Here we have a real debate. At the world conference on population in 1974 held in Bucharest it was strongly argued that the key to stage three was economic development.

The family planners who had imagined that you could solve the problem of overpopulation by providing people with contraceptives were derided as naive. It was no good taking contraceptives to people who wanted large families because they wouldn't use them.

What you had to do was to look at the reasons people had for wanting lots of children, and these reasons were to be found in the economic structure of the pre-industrial societies in which they lived.

Returns from child labour were high, kinship networks were strong, and parents had no other source of social security in their old age than their adult children, especially their adult sons.

But economic growth would mean less child labour and more child education, changing the costs and benefits of childrearing, and it would lead to a modern welfare state, reducing the need to depend on children in old age.

Until, and unless, the Third World experienced industrialization and economic growth you couldn't expect family size to come down.

If you were sincere about doing something about the population explosion, the slogan was "economic development is the best contraceptive".

But the problem with this view is that the prospects for Third World countries reaching the same standard of living as the first world are remote, and that even if they were to manage it the massive extra use of energy and other resources would lead to environmental collapse in any case.

Since 1974 we have learnt that the family planners were not so naive after all. There is an unmet demand for family planning and if this need were met there would be a real drop in birth rates, though they would still not fall far enough.

But does this mean that massive industrialization and all its attendant problems is the only way to adjust people's preferences so that they start to want the two child family?

Not necessarily. Professor Caldwell's work at the Australian National University is important here. He suggests that it is not industrialization itself that is the key, but certain factors that are usually associated with it but which could happen without it. After all Australia was hardly an industrialized society in the late 19th century when birth rates began to fall here.

Two factors that he puts a lot of weight on are nuclear families and education.

Education is important, not because it makes parents more "rational" so that they suddenly open their eyes and see that their "real interests" lie in having fewer children, but because it increases the costs of children and thus changes the structure of the parents' economic interests. (And you can have at least primary education without massive industrialization.)

Nuclear families are also important, for all the reasons that often lead us to criticize them. They turn the parents' interests inwards and make them think about themselves as a couple and their own personal interests first and foremost.

In many pre-modern societies the relationship between adult brothers may form the strongest emotional bond for men (and the relationship between adult daughters and their mothers the key bond for women).

In such circumstances men are less likely to give a high priority to their wives' health or other needs when they are fathering children. Indeed, in an extended family system the father may have little direct responsibility for the child at all.

So the person who is making the key decisions in producing a child is not the person who is going to bear the main costs. On the other hand he is likely to reap advantages from the wealth and prestige that may be accorded to fathers of many children.

The nuclear family changes this and husbands and wives become the most important people for each other and bear the costs of childrearing together.¹¹

Calwell calls these changes "Westernization" rather than industrialization, and argues that it is possible for nuclear families to develop without full scale industrialization.

Historians who have studied these changes in European families over the last four to three hundred years reach similar conclusions.

The social changes that have produced nuclear families are associated with smaller families, and with a culture in which each child becomes more important as an individual, receives more attention, and has more resources spent on his or her upbringing

For example, Lawrence Stone points to the role of the development of strong institutions outside the kinship network as a partial reason for the development of more inward-looking nuclear families.

This development could only happen when people had less need to look towards their kin for protection, and began to feel that they owed more allegiance to the church and to the state than to remote members of their family. Stone also emphasizes the development of Protestantism, with its concept of "holy matrimony", as a factor which increased the attention couples paid to the quality of the relationship between them.

As the strength of kinship ties weakened, family patronage declined with them and relatives outside the immediate family circle had less to offer.

The growth of bureaucracy in public life meant less nepotism, and the influence of uncles, cousins and other relatives waned. In the twentieth century in the western democracies the ascendancy of meritocratic principles in work and education dealt kinship ties a final blow.¹²

Stone is not trying to develop a theory to explain the demographic transition, but his work supports the argument that the development of nuclear families and the declining influence of kinship ties has been an important cause.

These new theories about nuclear and extended families are very relevant to the theme of international migration.

As Bob Birrell's recent work has shown, immigrant streams from developing countries into the west are strongly influenced by patterns of extended family reunion. This is because members of kinship groups feel a clear obligation to sponsor each other for entry.¹³

One of the key factors supporting high fertility in the Third World also supports the flow of migrants into the west.

The answers are not yet in on the causes of stage three, but we do know now that there are some factors that are associated with it:

- education, especially for girls and women (partly because it increases the costs of children and partly because it can lead to an increase in the perceived social value of girls and women and thus a greater respect for their needs);
- nuclear family structures;
- and appropriate family planning programs.

What is an appropriate family planning program? When you are talking about providing services for people who may not be very highly motivated to use them, small things may swing the balance. And in some cases the aspects of programs that have put clients off have not been small. It is important that programs be offered as part of an integrated health care scheme so that the clients feel that their needs are central to the program. Services that offer family planning and nothing else are, perhaps rightly, seen as being interested in controlling people rather than helping them. It is also important to offer a range of methods, with follow-up for people who are troubled by side effects or other anxieties, and to offer the services in a culturally acceptable manner.

We are now learning a lot more now about what works and what doesn't work in service delivery. With some contraceptives "social marketing" has worked well. Small traders are helped to integrate supplies into their normal stock of goods. Where medical methods are involved the best approach seems to be when family planning comes as part of an integrated development program and the local people have as much input as possible in designing and implementing the program.¹⁴

Intensification

The demographic transition is associated with growth. For those groups that pass through it, it is also associated with the end of growth and a new kind of population structure where the average [median] age is much higher than before.

But post-transition societies are only to be found in the twentieth century; growth itself has a much longer history and, where it was successful and higher numbers endured, it was inevitably accompanied by growing use of resources by the human species.

In the distant past this meant the migration of hunter-gatherers into new land; people displaced some other species but they used the new resources they had gained in the same way as they had used the old.

Sometime after 8 000 B.C. people began to domesticate animals and, later, to find ways of cultivating plants.

The discovery of agriculture meant that larger numbers of people could be supported using the same land more intensively. Nearly 400 years ago [from 1620] Indian hunter-gatherers in the Americas were displaced by European farmers and this led to a substantial increase in the production of resources.

The use of the land was intensified but, for the most part, the new system of production was sustainable.

But over the last hundred and fifty years growth has been fueled by other means. We have moved from muscle power to engine power.

We have exploited fossil fuels in manufacturing and, later, in agriculture with the development of mechanization, fertilizers, improved transport and storage facilities, and especially in the production of fertilizers.¹⁵

The invention of ways to harness power from coal and oil meant that far greater numbers could be supported than before.

The new machines, and the forces that drove them, and now the fertilizers and the other techniques of the Green Revolution, are not like the rich forests of New England but it was as if another New World had been discovered.

It was only an “as if” because the resources were not renewable and the new capacity to support life from them was temporary. But, during the C19th, European populations grew at an unprecedented rate, and most of these increases were blessed with prosperity rather than hunger.

W. Catton, in his book *Overshoot*, describes the prosperity associated with the industrial revolution and its agricultural application.

[His concept of “draw down” refers to a temporary method of increasing carrying capacity by extracting a resource which is not being replaced as fast as it is being “drawn down”. For example minerals and fossil fuels are not replaced as we use them. He compares this concept with the idea of “take over”, whereby one species gains opportunities “by reducing opportunities for competing species” as happens, for example, when the farmers take over the habitat of forest species. And he uses both concepts to explain how it is that humans have been able to increase their use of resources and support their larger numbers.]

He goes on to develop his argument that much of this increase is dangerously transitory, especially where it is based on the use of fossil fuels.

[“Take over” was more typical of the agricultural revolution and “draw down” of the industrial revolution. He claims that the “shift from take over to draw down” has been “disastrous”.]¹⁶

But his general theme is that of intensification. Greater numbers have been supported by using resources more intensively.

And this concept of intensification is one that we can use to help us understand how growth has been supported so far, and to think about the implications for the future.

We are seeing intensification more and more today. There is pressure to use what we have more thoroughly and completely, with little thought of how this intense pressure on the natural and built environment can be sustained. Intensification is an issue here, in Australia. We are probably most aware of it in the cities. Traffic and crowding increase and we must give up the quarter acre block and move into medium density housing, dual occupancy, and even high rise.

Exponential growth

In terms of the day to day events that fill our immediate consciousness contemporary population growth is a relatively slow process. It is not like a train strike or an election. You don’t have to pay attention to it if you don’t want to and you probably won’t see it on television, but this does not mean that it is very slow.

Substantial growth has occurred, and will continue to occur, in the space of our own lifetimes.

[The population explosion is only an “explosion” when we take a perspective that is longer than days or weeks, but it is not a long drawn out affair.]

The greater part of it so far has happened in the last 50 years, and the next 20 to 60 years will be quite crucial in determining the eventual outcome.

Traced on a graph the figures show the exponential tendency that Malthus described in 1798 in his *Essay on the Principle of Population*. Populations growing at a constant rate

expand like sums of money invested at compound interest. In 1989 the world's population was growing at the annual rate of 1.8 per cent.

If the world's population were to continue to grow at this rate it would double every 38.5 years, reaching 10.2 billion in 2027 and 20.4 billion in 2066 (and 40.8 billion in 2104 and 81.6 billion in 2143 and so on).

Numbers can be deceptive; 1.8 per cent seems such a little figure, yet it would double the world's population within the lifetimes of people now in their mid thirties and mean that children born today could see a world of over 20 billion before they died.

This probably will not happen. Perhaps death rates will rise again and many of us, if not most, would be pushed back into the first, stage pre-transition stage of history.

But birth rates are falling and it is often predicted that the world will have passed through the demographic transition and come safely out the other side, into stage three, by 2100, when there would be around 11 billion people.

Population momentum

One fact that is not widely known is that there is a gap between achieving replacement fertility and reaching zero population growth. The length of time and the numbers added during this gap depend on the age structure of the population when replacement fertility was first established. Growth may continue for forty years or more.

A past history of growth leaves the legacy of a youthful age structure so that even if all existing couples start to prefer a two child family, there are so many children and young people already born that by the time they grow up and have their two-child families the population will have experienced substantial growth. For example, Australia has a history of very rapid growth during the post war decades which has left her with a youthful population. Australian fertility has been below replacement since 1976 but numbers have grown from 14 million at the end of that year to an estimated 16.8 million in June 1989.¹⁷ It is true that this period, like the 1950s and 1960s, has been one of heavy immigration, but growth from natural increase has been maintained at around 0.8 per cent per annum. If net immigration were zero and Australian birth and death rates remained at around their present levels, the population would grow to 19 million in 2031, and some two and half million people would be added.¹⁸ (Indeed net migration into Australia only has to stand at slightly more than 50 000 per annum, say 55 000, for the population to keep on growing for ever.)¹⁹

Population momentum is the reason for China's one child policy. Though birth rates have risen slightly since 1987, China is now close to replacement fertility, but her past history of high fertility has given her a very youthful population. Policy makers believe that the two child family will not halt growth quickly enough and consequently they are aiming for below replacement fertility.

But, even if the effort to reduce family size to one is successful China's present population of just over 1 billion could grow by another half billion.²⁰ Replacement fertility does not mean that growth has come to a halt, or even that stabilization is very close. It's the first step but, if replacement fertility arrives in a population with a past history of growth and thus a youthful population structure, the time lag and numbers added during that time lag will be considerable.

Projections

Current population projections and estimates of agricultural capacity are sometimes used to provide some idea of the amount of time we have left in which to work for change. The social sciences, including economics and demography, have long been piqued by their inability to match the natural sciences' precise measurement and powers of prediction. But, among all the social sciences, demography is the best at making reliable predictions. Short term demographic predictions for large areas or nation states are quite accurate, more so, for example, than economic forecasts, and for a longer time.

But this does not mean that long-term population predictions are very reliable; they may only be good for 5 to 20 years, yet they are often used for much longer. Projections used as illustrations in public debate also commonly finish with a happy ending of zero population growth, where an average family of 2.1 children per woman fortuitously balances the death rate and maintains a stable stationary age structure. Yet there is no logical reason to suppose that this will happen.²¹

One must of course distinguish between predictions and projections. Unless there has been an arithmetic error, population projections are always correct because the demographer is saying, "If my assumptions about births, deaths and net migration hold true, then the population of this area in such and such a year will be of this size and composition". But, while realistic assumptions may indeed hold true for a short period, real rates of fertility, mortality, and migration will almost certainly diverge from a set of assumptions over an extended period. So, when demographers are asked to calculate a projected global population for, say, the year 2100, they are doing some arithmetic based on a number of informed guesses on the most plausible assumptions and there is no strong reason to believe that these guesses will be correct.

Current assumptions tell us that the world will reach replacement fertility sometime in the first half of the twenty-first century which would lead to an eventual world population of around 10 or 11 billion by the year 2100. But in fact we cannot predict what the world's population will be in a hundred and ten years; a stable stationary figure of 11 billion is simply an estimate that gives comfort to present anxieties because some analysts hope that it could prove to be a manageable number.²²

Table one about here

Table one describes the growth of the world's population from 1800 to 1985 and gives projections for 2100 based on United Nations and World Bank estimates which assume

that, by this date, all regions will have reached replacement fertility and population stability. The figures for the year 2100 can be considered as a final point, a description of the size and distribution of the world's population when growth has finally ceased.

These figures should be taken only as a sketch of one possible future. They are a little better than a wild guess, but they depend on many doubtful assumptions. They assume that fertility in the developing world will have declined to 2.1 during the 21st century and that in the developed world it will have risen to 2.1. They assume an average life expectancy of 75 years, a figure that has already been exceeded by a number of industrialized countries.²³ (Average life expectancy could rise beyond this figure with better health care and medical innovations, or it could drop as conditions for supporting human life deteriorate.) And they make no allowance for the effects of international migration.

But the projections for 2000 are much more likely to be reliable predictions simply because the time span is shorter. We can therefore pose the question of whether or not the developing countries are likely to be able to support their projected populations in the year 2000.

Feeding the near future

Some analyses of the earth's capacity to feed itself take a global perspective and point to the food surpluses of North America, Europe and Australia and argue that there is no real scarcity; the world has enough resources to feed its present population and many more besides.

Almost 92 per cent of the projected growth between 1985 and 2000 will occur in the developing countries; if there are scarcities for some and plenty for others, the poor must rely on the others for food. Whether food imports come as trade or aid, a country that cannot feed itself, and which has no strongly based export sector in manufactured goods or other commodities, lacks fundamental security. Research on the population and resource question that is based on individual countries does not tell us about absolute global limits but it can shed light on the question of the degree of autonomy that vulnerable areas may be able to retain as their population grows.

The Food and Agriculture Organization of the United Nations has done a detailed study of the capacity of individual developing countries to cope with their share of the population increase in the year 2000.²⁴ Apart from China, Mongolia, the Democratic People's Republic of Korea and the Republic of Korea, almost all developing countries were studied, giving a total of 117. The study assumed that all suitable land would be used for agriculture and assessed the rain-fed growing potential for 15 major food crops as well as an area's capacity to support live-stock on grassland that was not suitable for food crops.

The assumption that all land with agricultural potential would be exploited implied that more than three times the amount of land used in 1975 would be under cultivation in the year 2000, including large tracts of the Amazon and other tropical forests.

An analysis was made of the land's capacity to produce food under three different kinds of agricultural inputs:

low-level inputs which consisted of traditional farming methods and no long-term conservation measures;

an intermediate level using some fertilizer, pesticides and improved crop varieties on half the land and the most productive crop mix on the other half;

and a high level of inputs which included full use of fertilizers, pesticides, improved crop varieties, conservation, and the best mix of crops on all the land. This high level was taken as corresponding to the most productive farming methods in use in the west.

Land needed for settlement, transport and some other purposes was subtracted from the total, and the number of calories that could be produced on the remainder was then calculated for each country for each level of inputs. The total numbers of people who could be fed in the year 2000 were then calculated.²⁵

The study concludes that even with low inputs, the vast expansion in agriculture land that it envisages would mean that the 117 countries, taken as a group, would be more than able to support themselves in 2000 though this collective result obscures wide differences between countries.

But the authors are aware that their assumption that all suitable land will be used for food crops and none reserved for forestry, fibres, vegetables, cash crops and so on, is unrealistic. They therefore reworked their calculations deducting one third so that it could be set aside for these purposes.

The number of countries that would be unable to feed all of their people in 2000 with low inputs then increased to 75; those that would be in difficulty with intermediate inputs rose to 43; and those that would be unable to cope even with high inputs rose to 39.

One of the most crucial assumptions in the study concerns the expansion of cultivated land. If this should in fact not prove feasible the future is grim. In 1975, on existing cultivated land with existing populations, low inputs, and with the one third reduction, the authors estimate that 99 of the 117 countries were unable to feed all their people; this estimation is corroborated by contemporary data on food imports.²⁶

The study has been criticised on a number of grounds. Chief among these is the assumption that the amount of land under cultivation can be increased three-fold. Also, given the costs of modern agricultural techniques and the level of debt in most of the

world's poorer nations, it is unrealistic to assume that most of the countries would be able to employ high levels of agricultural inputs. Clearing tropical forests for agriculture may only serve to decrease agricultural potential as the green house effect intensifies and the new farming land with its fragile soils degrades. The gravest concern is that the report's projections only go as far as the year 2000 and cannot take account of problems posed by growth after that date.²⁷

Policies?

Growth from natural increase in the developed countries, especially growth in Europe, has almost come to an end.

In the developing countries the situation is different. They will add almost a billion people during the 1990s and, unless there are radical changes, still more during the twenty-first century.

For many individuals international migration to the west will offer a personal solution to the problem of local population pressure and the social dislocation it gives rise to.

Those who are successful will often be among the best educated, the healthiest and the most highly skilled of their compatriots. Their exodus will continue a flow of people already well established in the 1970s and 1980s.

But, if even a modest proportion of third world growth continues to be relocated in the west, there will be substantial consequences, both for the nations that send their people and the nations that receive them.

We have already had a look at a number of policies that might help to check population growth: education (especially of girls and women), family planning, and the support of nuclear families.

We can add to these a fourth strategy: firm control of international migration.

In the case of the first three policies, if they are to be successful they must be implemented by the nations directly concerned. We can offer help and aid if we are asked, but implementation is out of our hands.

With the fourth strategy the situation is different. Here there is something that we can do ourselves and Australia, as a present host for a large annual inflow of new migrants, can play a direct role.

At the moment many of the best and brightest in the developing world have fixed their hopes on trying to arrange emigration for themselves and their families. Some of them are successful: most are not. But a lot of human effort is expended in the attempt.

If Western countries send out a clear message that this is not really a viable option, then more of the highly educated and able people in the Third World may direct a larger proportion of their personal energy to trying to solve their countries' problems, rather than trying to escape from them.

Table 1: Population growth in broad regions of the world, observed (1800-1985) and projected (1985-2100) (in millions)²⁸

	years				
continents regions countries	1800	1939	1985	2000	2100
World	954	2 195	4 842	6 127	11 011
Developed world*	227	799	1 179	1 284	1 423
Developing world	727	1 396	3 663	4 843	9 588
China	330	455	1 063	1 256	1 481
Japan	25	72	120	128	128
India, Pakistan					
Bangladesh	180	381	964	1 250	2 538
Rest of Asia	96	254	677	910	1 793
Asia	631	1 162	2 824	3 544	5 940
Europe	146	403	492	513	533
USSR	49	170	278	315	377
North America	5	143	264	298	325
Oceania**	2	11	25	30	40
Population of European origin	202	727	1 059	1 156	1 295
North Africa	10	49	125	185	460
Rest of Africa	92	126	428	692	2 376
Africa	102	175	553	877	2 836
Latin America	19	131	406	550	940

References

- ¹ J. Jacobson, Environmental Refugees: A Yardstick of Habitability (Worldwatch Paper 86). Worldwatch Institute, Washington, 1988, pp. 5-6. There is no official count of environmental refugees; 10 million is the author's estimate. She compares it to the total of 13 million political refugees in 1988.
- ²Here I am drawing on Hirsch's concept of the 'positional economy'. See F. Hirsch, . Routledge and Kegan Paul, London, pp. 1-12, 41-51.
- ³ R. Foley and R. Dunbar 'Beyond the bones of contention', New Scientist, vol.124, no. 1686, 1989, pp. 21-25; R. Leakey, The Making of Mankind. Abacus, London, 1981, pp. 110-25, 78; C. McEvedy and R. Jones, Atlas of World Population History. Penguin, Harmondsworth, 1978, p. 13-14; Leakey, The Making of Mankind, p. 112, and McEvedy and Jones, Atlas of World Population History, p. 14. Current population figures in this chapter are taken from the 1989 World Population Data Sheet published by the Population Reference Bureau, Washington.
- ⁴ Population Today, vol. 15, no. 7/8, 1987.
- ⁵ A.Coale, 'The history of the human population',The Human Population (Scientific American). Freeman, San Francisco, 1974, pp. 17, 21, 25.
- ⁶ Henderson quoted in E. Willis, Medical Dominance. Allen and Unwin, Sydney, 1983, pp. 68-9.
- ⁷ A .Sauvy, General Theory of Population (translated by C. Campos). Methuen, London, 1969, p. 205
- ⁸ Sauvy, General Theory of Population. p. 422
- ⁹ See J. Caldwell, 'Towards a restatement of demographic transition theory' Population and Development Review, vol. 2, nos 3 & 4, 1976, p. 350.
- ¹⁰ R.Lightbourne, S. Singh, and C. Green 'The World Fertility Survey: charting global childbearing', Population Bulletin, vol 37, no. 1, 1982, p. 44.
- ¹¹ see Caldwell, 'Towards a restatement of demographic transition theory',1976 and Caldwell ???1977
- ¹² Stone, The Family, Sex and Marriage in England: 1500 -1800. Weidenfeld and Nicholson, London, 1977.
- ¹³ See R. Birrell, The Chains that Bind, (Bureau of Immigration Research), Australian Government Publishing Service, Canberra, 1990.
- ¹⁴ [Material on family planning programs distilled from various articles in Studies in Family Planning.]

¹⁵ See Catton for an analysis of this process. W. Catton, Overshoot: The Ecological Basis of Revolutionary Change. University of Illinois Press, Urbana.

¹⁶ Catton, Overshoot, p. 32.

¹⁷ Social Indicators No 3, Australian Bureau of Statistics, Canberra (Catalogue No. 4101.0), 1980, p.3 and Australian Demographic Statistics: June Quarter, Australian Bureau of Statistics, Canberra (Catalogue No. 3101.0), 1989.

¹⁸ The population would then start to decrease, but it would not reach its present size again until around 2086, some 100 years from now. See C. Young, "Towards a population policy: myths and misconceptions concerning the demographic effects of immigration", Australian Quarterly, Vol. 60, No. 2, 1988, p. 221. But we are a long way from zero net migration (which, with the current level of emigration, means 20 000 new settlers per annum); net total migration for 1988 was 165 000 not zero and, because of this, Australia now has the fastest rate of population growth of any country in the developed world. During 1980-86 Australia's average annual rate of growth was 1.4%. In 1987 it was 1.5%. If this were to continue the population would double every 43 years. These rates were much higher than those for European countries, and exceeded those for North America. Canada's average rate between 1980-86 was 1.1% and that of the United States was 1.0%. Expressed as a rate per head of the existing population, our immigration intake since 1980 has been at least twice as high as that of Canada, our nearest rival. C. Young, "Australia's population - a long-term view", Current Affairs Bulletin, Vol. 65, No. 12, p. 14.

¹⁹ C. Young, "Towards a population policy: myths and misconceptions concerning the demographic effects of immigration", Australian Quarterly, Vol. 60, No. 2, 1988, p. 226.

²⁰ T Merrick and Population Reference Bureau staff, 'World population in transition', Population Bulletin, vol. 41, no. 2, 1986, p. 6. These authors suggest an eventual Chinese population of 1.57 billion, slightly more than the figure given in Table 1.

²¹ P. Demeny, 'Demography and the limits to growth' in M. Teitlebaum and J. Winter (eds) Population and Resources in Western Intellectual Traditions. Population and Development Review (A supplement to volume 14, 1988). The Population Council, New York, 1988, pp. 238-9.

²² Demeny quotes an estimate of 'slightly above 10 billion', calculated for the World Bank in 1988. The figure of 11.011 billion in Table 1 also comes from a World Bank publication but it is based on United Nations' projections. See Demeny pp. 240-1. Demeny argues that demographers have a history of producing 'reasonable' projections. He implies that he believes the eventual numbers will be higher than 10 billion but that this will not pose serious resources problems, and that demographers will adjust their 'reasonable' projections to reflect the higher figures.

²³ See J. Bourgeois-Pichat, 'From the 20th to the 21st century: Europe and its population after the year 2000' translated by L. Sergent, Population: English Section No. 1, (articles selected from Population, vol. 44), 1989, pp.57-90. Bourgeois-Pichat discusses all these limitations except migration.

²⁴ The study worked on the base year of 1980 when the world's population was 4.43 billion. It used the United Nation's medium set of population projections which produce a population of 7.81 billion in 2020; 93 per cent of the growth from 1980 to 2020 was projected to occur in the developing world. Land, Food and People. p. 46

²⁵ The number of calories to be consumed per person was based on the recommended levels developed by the Food and Agriculture Organization and the World Health Organization. Land, Food and People. Food and Agriculture Organization of the United Nations, Rome, 1984, pp. 2-3

²⁶ Land, Food and People. pp. 39, 45. This estimate still rests on the assumption of national autonomy and equitable distribution. Some hunger in 1975 would have been alleviated by imports and some would have been exacerbated by local inequalities.

²⁷ L.Brown and J.Jacobson, Our Demographically Divided World (Worldwatch Paper 74). Worldwatch Institute, Washington, 1986, pp.12-13

²⁸ Source: derived from Bourgeois-Pichat (1989: p. 65). His projections for 2000 and 2100 are based on United Nations [medium range] and World Bank figures. *The dichotomy between developed and developing countries used here follows the United Nations' classification. The developed countries are those in Europe, North America and Oceania, plus Japan and the USSR
**Oceania includes a number of nations that would be classified as developing (by the criterion of income per head) but most of the people in this group (78 per cent in 1989) live in Australia and New Zealand.