

Will the Baby Boomers be remembered as the Generation that killed off the Wild Animals?

An Argument for Urgent Action on Human Population Stabilisation

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The World Wildlife Fund Living Planet Report 2016 has just been released and it says that from 1970 to 2012 the index of vertebrates on the earth decreased by 58% and is heading to 67% by 2020 (WWF, 2016, page 9/74). Following this trend with human population increase and the associated further decline of wild animals, in 2060 we will probably have only 9% (a 91% decrease) of the wild animals we had in 1970. That isn't what any generation wants to be remembered for.

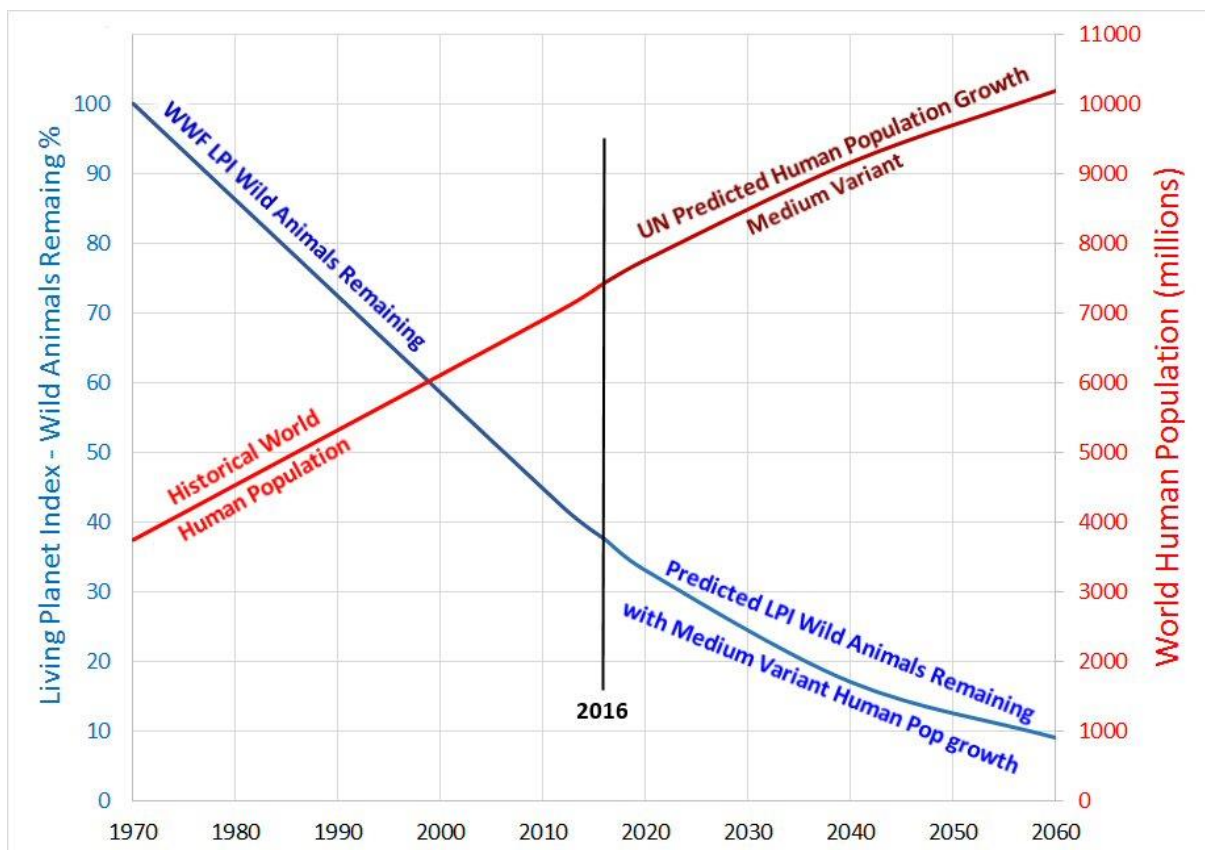


Figure 1 – Population Growth since 1970 compared with the Living Planet Index since 1970 and into the future. It is likely that the existing trends will continue unless dramatic changes are made and if they do continue that means we will have destroyed 90% of the wild animal population in one lifetime. The blue line in the lower right corner shows the remaining Living Planet Index of wild animals going down to 9% of the 1970 levels. It is also important to remember that more than half the world's natural habitats had already been destroyed by 1970.

Our World's other species are in imminent danger due to human population growth and human resource use. It can be shown in a step by step manner that the quicker we act, the more likely it is our kids and grandkids will have a chance to enjoy as nice a natural and built environment as we did. The steps are as follows:

1. Baby Boomers Legacy
2. Wild Animals in big trouble, 2a. Fish in worse trouble
3. Relating Population to Environmental Degradation
4. What is the Living Planet Index?
5. Why can't we just fix the problem right now?
6. Population Growth doesn't stop when stabilisation measures start - China
7. Delaying the start of Population Stabilisation Measures has huge impacts- China
8. Using United Nations World Population Predictions to show the impact of delays
9. Resulting Environmental Impacts of population growth
10. Resulting Social Impacts of population growth
11. Proposed Steps to Stabilising Population
12. Impediments due to our Existing Political and Economic systems
13. Conclusions

1. Baby Boomers Legacy

Baby Boomers were born from 1946 to 1964. Baby Boomers are usually recognised as a privileged generation that expect life to get better every year. Probably 1990 to 2016 was the time the Baby Boomers were the dominant cohort on the planet making the big decisions that shaped the world. One of the big decisions that was made was to encourage human population to continue to boom across the earth (with a few exceptions), at the expense of all the other species. As a privileged generation with expectations that everything always gets better, it is probably understandable that we didn't think to see if anything was going wrong

2. Wild Animals in big trouble

Baby Boomers have had plenty of help killing off the wild animals. Population Growth was rampant from 1946 to 1964, that is why it is called the Baby boom and that is hardly the fault of the Boomers. Once the birth rate is high it is very difficult to reduce it (more on that in the next couple pages), so the Baby Boomers were always going to have a tough time. Even so, 1990 to 2016 is a long time to think things through and many countries, most notably America and Australia have energetically pursued policies to increase their populations at the expense of all other species. Since 1990, we've probably killed off at least 16 billion birds, 80 billion mammals and 800 billion reptiles and amphibians. We will talk about Fish later. (These are very rough figures since it is not easy to count wild animals, because they are wild). It's not a proud record. In encouraging the human population to increase from 5.3 billion to 7.4 billion we've caused the death of more than 750 billion wild animals. About 350 wild animals per person. That means that Australia's population increase of 372,000 from 2015 to 2016 probably caused the death of about 130 million wild animals. The United States 2.4 million person increase is likely to have cost the earth about 850 million wild animals. Probably not our most worthy accomplishment.

Worse, though, is that even if we agreed to try and stop it, the wild animals are going to be in big trouble for a long, long time. If we continue on the same path we are on now, by 2060 we will have killed off another 23 billion birds, 120 billion mammals and 850 billion reptiles and amphibians. That is more than we've killed off since 1990, even though it is assumed that the killing rate will slow down. The rate will slow down because most of the good living areas have already been cleared and the good waterways have already been polluted.

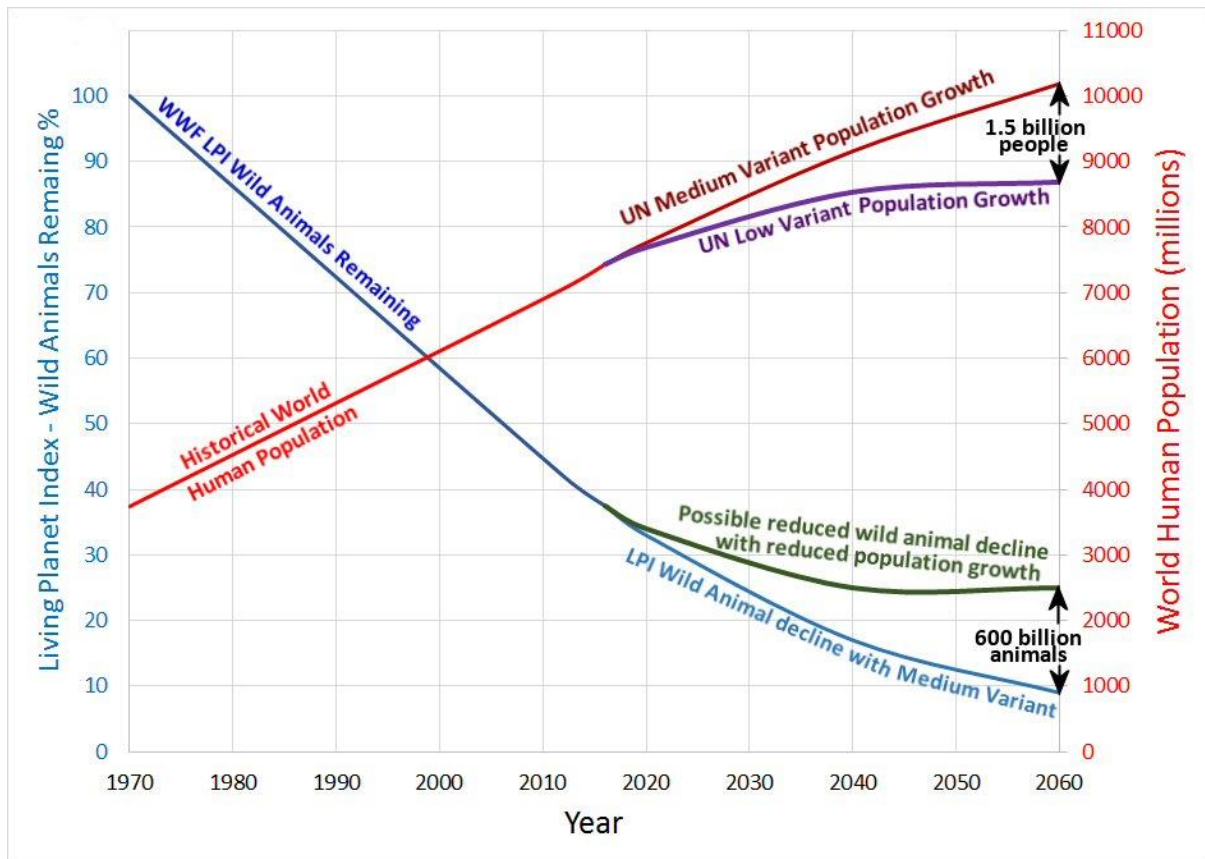


Figure 2 – Comparison of Living Planet Index Wild Animals Remaining with Population Growth considering that a change to the United Nations Low Variant population growth scenario could be made. The graph shows that if we could reduce the population growth by 1.5 billion people we could probably save about 600 billion wild animals.

If by an enormous effort from all the countries of the world we were able to slow population growth to the “Low Variant” defined by the United Nations (UN Population Division, World Population Prospects, the 2015 Revision), we could probably save 600 billion wild animals. That includes 11 billion birds, 78 billion mammals and 480 billion reptiles and amphibians. Unfortunately, we would still be on the path to kill 390 billion wild animals before we could stop the population growth and start to live more sustainably. The high point, though, is that the wild animal population declines would stop about 2045 if we were able to quickly get to the low variant population growth. With the Medium variant the wild animal population declines would continue well past 2060.

2a. Fish in worse trouble

Fish are included in the WWF Living Planet Index, but their condition is so bad that they need to be considered separately. We have overfished the oceans and inland waterways so badly, that the previous sections methods can't be used to calculate how many fish might remain compared to 1970 or 1990. For Fish, 2016 is like 2050 or 2060 might be for birds mammals, reptiles and amphibians. The oceans and inland waterways are already so depleted that we probably won't see the dramatic reductions of the other vertebrates.

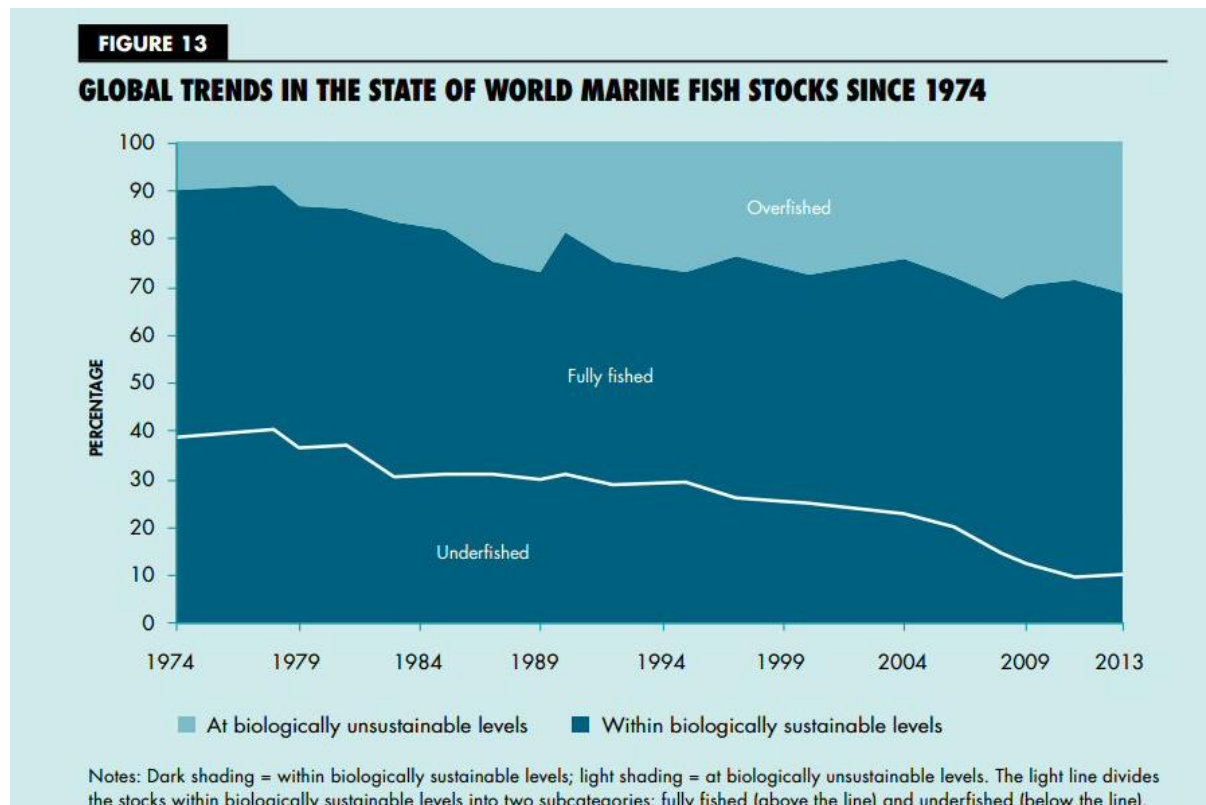


Figure 3 – Figure 13 from *The State of the World's Fisheries and Aquaculture 2016*, page 51/204, prepared by the Food and Agriculture Organization (FAO) of the United Nations. <http://www.fao.org/3/a-i5555e.pdf>

The figure shows that in 2013, 30% of the world's fisheries were overfished as indicated by the light blue area at the top of the graph. The graph also shows that 55% were fully fished as represented by the dark blue band in the middle. Adding the 30% and 55% gives a total of 85% either overfished or fully fished, meaning that 85% of these fisheries are stressed. The graph also shows that the trends are getting steadily worse and have been for 40 years.

Freshwater fish are in worse trouble than marine fish according to the WWF Living Planet Report, but there isn't enough reliable data to make a comprehensive graph like Figure 13 above.

3. Relating Population to Environmental Degradation

Many people don't see a connection between the world's human population and the environmental degradation that has caused the wild animal population to drop so sharply since 1970. Humans cause the loss of wildlife in the following ways:

- Habitat Destruction / Land Clearing for farming, logging, human occupation
- Exploitation – Directly killing the animals, most dramatically fish
- Pollution – Air pollution kills plants that animals rely on, polluted water kills animals
- Invasive species and Disease – Usually brought by humans
- Climate Change - Changes to vegetation available, breeding cycles based on seasons

Humans already utilise over half of the world's good land and we've had a negative impact, from the wild animal's perspective, on much more. We only live on 3% of the world's land but nobody, humans or animals wants to live in the deserts or the tundra. The best places for us to live and grow our food are the best places for the wild animals to live and we have taken most of those good places for ourselves. As population increases we will need more and more land and that means that the wild animals will get less.

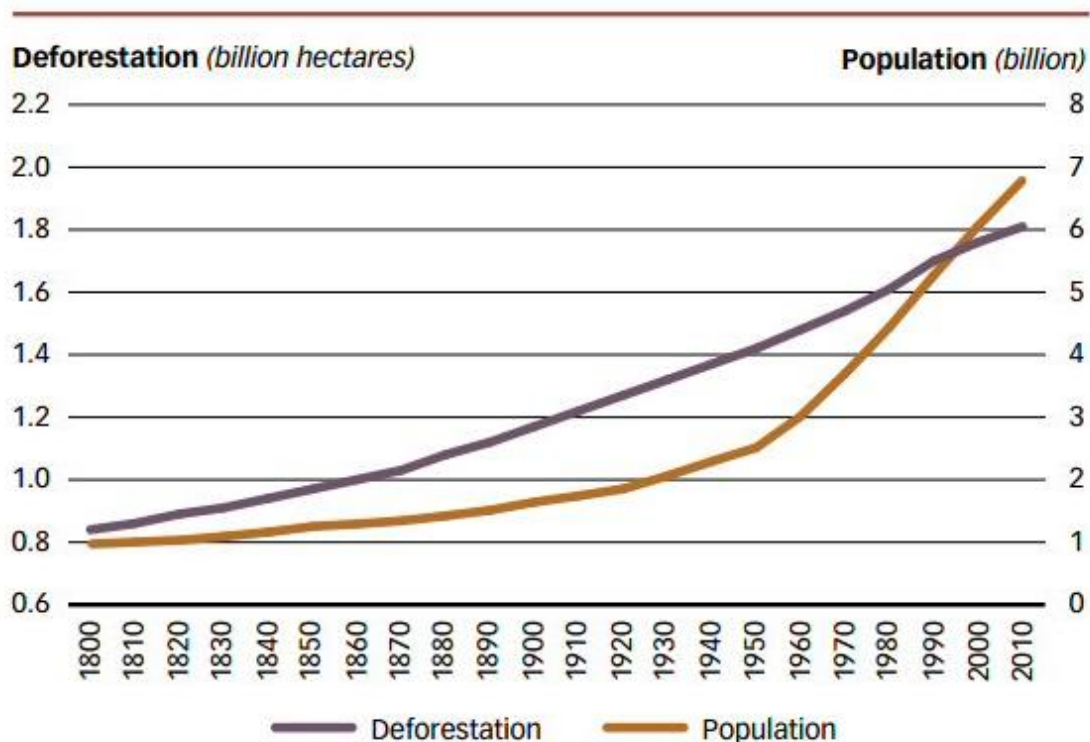


Figure 4 – FAO State of the World's Forests 2012, Figure 1, page 9, showing that in 1800 there had already been 0.8 billion hectares (8 million km²) of forest cut down increasing to 1.8 billion hectares (18 million km²) in 2010

<http://www.fao.org/docrep/016/i3010e/i3010e.pdf>

By 1970 humans had already cleared, altered and impacted half of the world's original forests. The World Wildlife Fund has to use 1970 as a starting point because there is not enough good data before 1970 to develop the index. Using 1970, though, softens the real impact that humans have had on wild animals. It is likely that by 1970 humans had already killed half of the world's Pre-Human number of wild animals. Based on that assumption it is likely that by 2060 we will have killed off about 95% of the world's original wild animal numbers to make room for ourselves.

Each person on earth uses an average of 4.7 barrels of oil per year, one tonne of coal per year, 500 cubic metres of natural gas per year, 3 tonnes of concrete per year, 330 kg of grain per year, 20 kg of seafood per year, 2000 litres of water per year, as well as thousands of other commodities. No one has ever suggested that the additional human population won't want more of the same. In fact, if someone did suggest it, they would be considered inhumane. A high standard of living is necessary for the provision of what we consider basic human rights such as clean water, clean air, adequate food, health care, education and a fair justice system. A high standard of living is also closely associated with high energy, food and material usage. It therefore follows that as population grows, energy, food and materials usage will grow and the accompanying environmental degradation will run essentially parallel to the increasing human population. That has been the pattern of consumption since well before 1970.

As population increased, food, oil, gas, coal, concrete, steel and all the other commodities we love have increased at similar rates to the human population.

In future years those commodities will continue to be needed in ever greater numbers not only as human population increases but as affluence increases.

With the world's wild animal numbers already declining dramatically, the increasing population can only cause further declines.

Many people don't think they are responsible for wild animal die-off, because they didn't personally cut down any trees or clear any grasslands. If people want to take advantage of the global economy, though, they need to accept the consequences of global supply and demand. Anyone who demands a commodity, gives an incentive to fill that demand all over the world. If people demand energy they are giving an incentive for an entrepreneur to cut down tropical rainforest to provide land to grow sugar cane for ethanol or in some cases to simply provide firewood. If people demand food they are giving an incentive to clear forest and grasslands for grazing lands or crops.

The 3 billion people that are likely to be added to the world human population by 2060 will all want a developed world lifestyle with the associated energy, food and material usage that entails. When 10 billion people demand a developed world lifestyle, the result will be a proportionate amount of environmental degradation. That environmental degradation is the cause of the death of so many wild animals. Reducing the number of people will reduce the energy, food, materials and environmental degradation and increase the number of wild animals.



4. What is the Living Planet Index?

The Living Planet Index is not a simple count of the number of wild animals on the earth or a count of the numbers of species. The World Wildlife Fund Living Planet Index Report 2016-Technical Supplement (at the link below) has the following statements that help understand the calculation of the Living Planet Index.

http://d2ouvy59p0dg6k.cloudfront.net/downloads/lpi_technical_supplement_2016.pdf

The Living Planet Index (LPI) is a measure of the state of the world's biodiversity that tracks trends in abundance of a large number of populations of vertebrate species.

The data used in constructing the index are time series of either population size, density (population size per unit area), abundance (number of individuals per sample) or a proxy of abundance; for example, the number of nests or breeding pairs recorded may be used instead of a direct population count.



The Living Planet Index is currently based on time-series data for 14,152 populations of 3,706 species of mammal, bird, reptile, amphibian and fish from around the globe. Using a method developed by ZSL (Zoological Society of London) and WWF (World Wildlife Fund), these species population trends are aggregated and weighted to produce the different Living Planet Indices.

Clearly every wild animal on the earth could not be counted accurately. Secondly, though, estimating the weight and importance of each species requires more sophisticated methods than simply estimating the total number of vertebrates. It would not be appropriate to equate the number of whales or elephants with the number of tiny fish, frogs or lizards. That is why the ZSL and WWF methods are used.



5. Why can't we just fix the problem right now?

Many of my friends who are opponents of population stabilisation and sustainability often say, "You worry too much Eric. When the time comes to be sustainable we will be sustainable. There is no need to panic. Modern Civilisation has gotten through tougher problems than this. World War I, the Great Depression, World War II, the rise and fall of communism. All solved. When we need to solve this one, we will. Times are good. Enjoy life, Eric."

Of course we are late now solving the depletion of wild animals, fish, groundwater and several others, but that doesn't really matter to my friends. When I tell my friends that this problem is different than the others, stabilising population takes a very long time even when you are trying very hard, they don't want to hear it. "You worry too much, Eric."

The explanation isn't simple but it can be explained, and better yet it can be explained with pictures, which is always helpful.

6. Population Growth doesn't stop when stabilisation measures start - China

China initiated some population control measures in 1970 (a kind of Two-Child policy) and then starting over two years from 1978 to 1980 and going to 2016, they instituted the (by Western standards) draconian "One-Child Policy." Since then (37 years) the population in China has increased by 400 million people or 40%. Even though Chinese women were having far fewer children each, there were so many women of child bearing age that the population kept rising. The point being that we won't just be able to "solve population growth when we need to." Even when you employ draconian measures, the population won't stop growing.

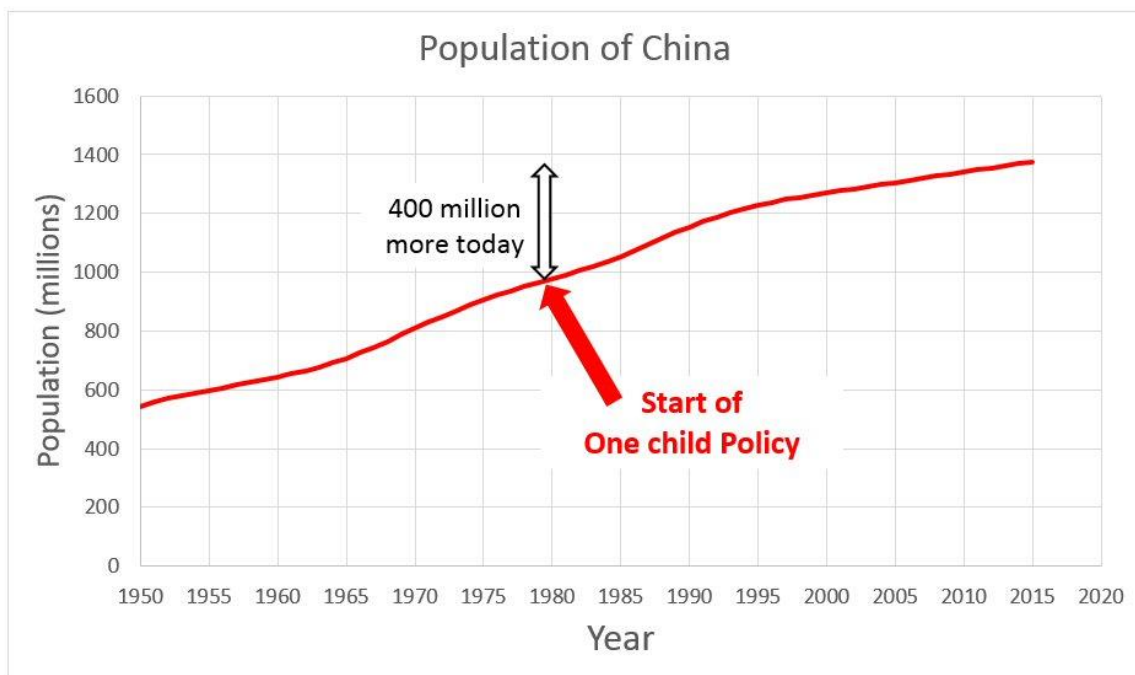


Figure 5 – Despite the start of the One-Child Policy over the two years 1978-1980, China's population has grown by 40 % since 1980

There is no way the rest of the world is going to employ a One-Child policy, but many people still think there is some magical way to suddenly stop population growth. There is no peaceful, humanitarian way to suddenly stop population growth. It has to be stopped slowly and consistently and that takes lots of time.

Spoiler Alert – Standard dogma among advocates of sustainability and population stabilisation is to never mention the One-Child Policy and if you absolutely have to mention it never-never-ever say anything good about it. The reason is because the American and Australian audience is too simple minded to distinguish between a policy that was appropriate for China and a policy that is appropriate for America and Australia. I hope we never need a One-Child Policy or Two-Child Policy in America or Australia, but currently both countries are actively trying to increase their populations. Both countries actively seek immigrants through immigration friendly policies. The US encourages illegal immigrants to work and even sets up safe cities where illegal immigrants can't be deported. The US has had several amnesties since 1980 so any illegal immigrant would be confident that they could just wait until the next amnesty. Both countries give tax benefits to families with more children. Increasing population is the opposite of what both countries and the world needs to do to avoid further environmental degradation, loss of wild animals and an overall drop in living standards for future generations.

So here goes: Population stabilisation policies in China (Two-Child Policy from 1970-1978 and One Child Policy from 1978-80 to 2016) have been very beneficial for China and for the world. The Chinese government says that 400 million births were avoided. If the growth rate from 1968 to 1977 had continued, the number would be more like 830 million people. China is vastly overpopulated and is still wreaking havoc on the environment with its current reduced population. With the much larger numbers they would never have made the social and economic advances that they have made and the environmental conditions that would exist with 2.2 billion people are even hard for me to imagine.

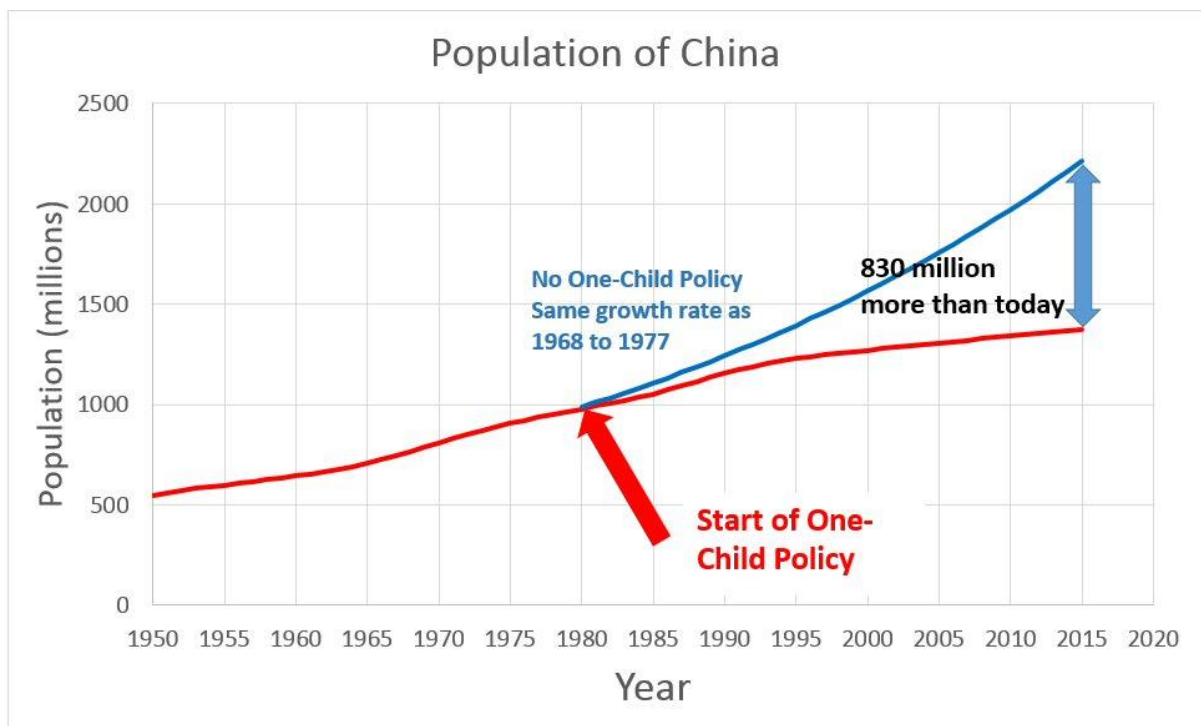


Figure 6 – China's Population assuming the 1968 to 1977 growth rate from 1980 to 2016



Figure 7 – A beach scene in middle class China in 2014, 35 years after the implementation of the One-Child Policy. Can anyone imagine an Australian or American family going to the beach in these conditions?

7. Delaying the start of Population Stabilisation Measures has huge impacts– China

The second part of the argument for urgency is that delaying action has very significant impacts on population growth. Using the growth rate from 1968 to 1977 to model the population growth if the One-Child was delayed by ten years shows that the delay would have added about 260 million more people to China's population. That means that China's population would have increased by 660 million instead of 400 million after 1980.

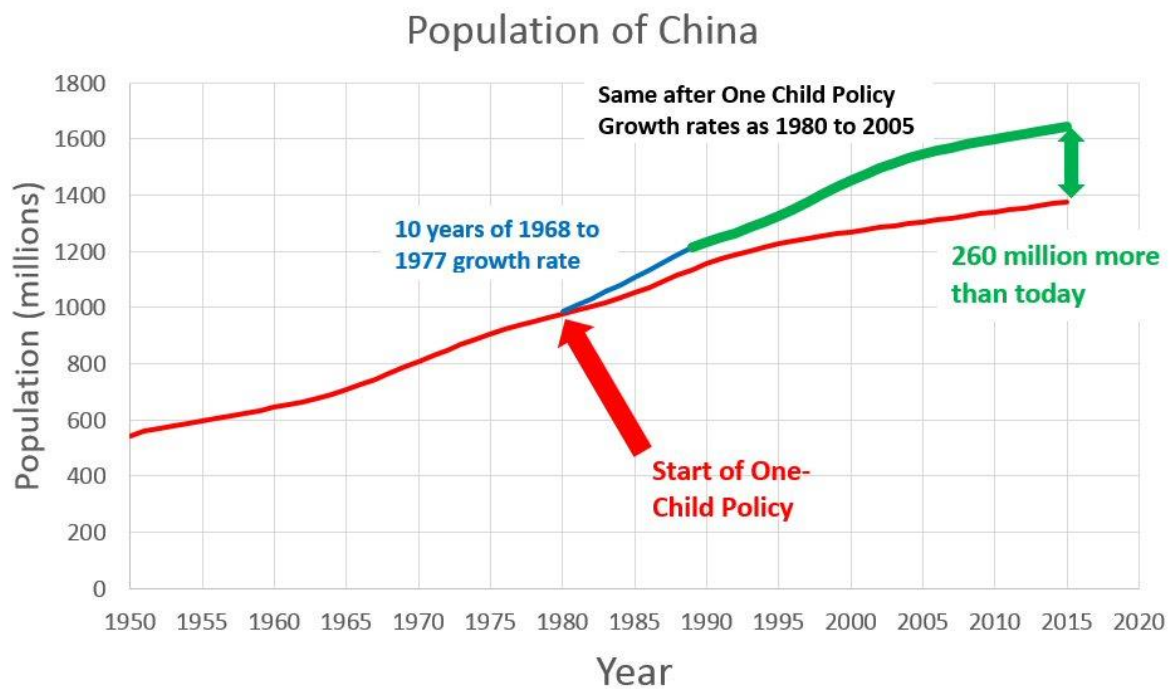


Figure 8 – A graph of the population of China assuming that the One-Child policy was started 10 years later resulting in 260 million more people in China in 2016.

The use of the 1968 to 1977 growth rate is a conservative assumption because the Chinese government started encouraging people to have only two children in 1970 and birth rates dropped dramatically after 1970. (Appendices)

The following section shows that the current world population growth has been rising like China's before their stabilisation measures. Even if we could make bold efforts to slow the growth down, there would still be significant population increases for many years before our population peaked. These population increases added to an already environmentally stressed planet mean we will see a reduction in wildlife, forest, water, soil, air quality, water quality, food security and energy security before it starts to get better. If we could start to reduce population growth we would see significant quantities of our environmental assets saved. We'd probably also end up with less poverty.

8. Using United Nations World Population Predictions to show the impact of delays

Following on from the historical population growth in China, we can use the United Nations Population Division, World Population Prospects 2015 to show what could happen if we employ serious population stabilisation strategies and also what will probably happen if we keep going the way we are.

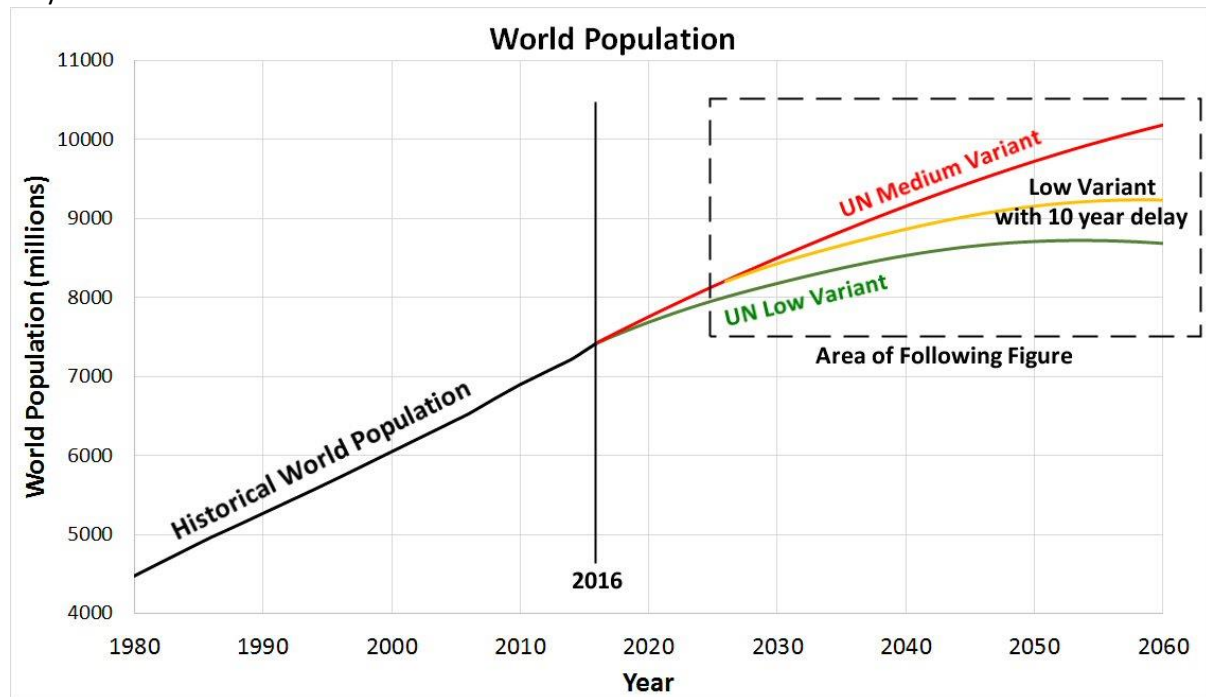


Figure 9 - World Population from 1980 to 2016 and then medium variant and low variant population growth from 2016 to 2060. The middle (yellow) path represents the medium variant from 2016 to 2026 and the low variant population growth from 2026 to 2060.

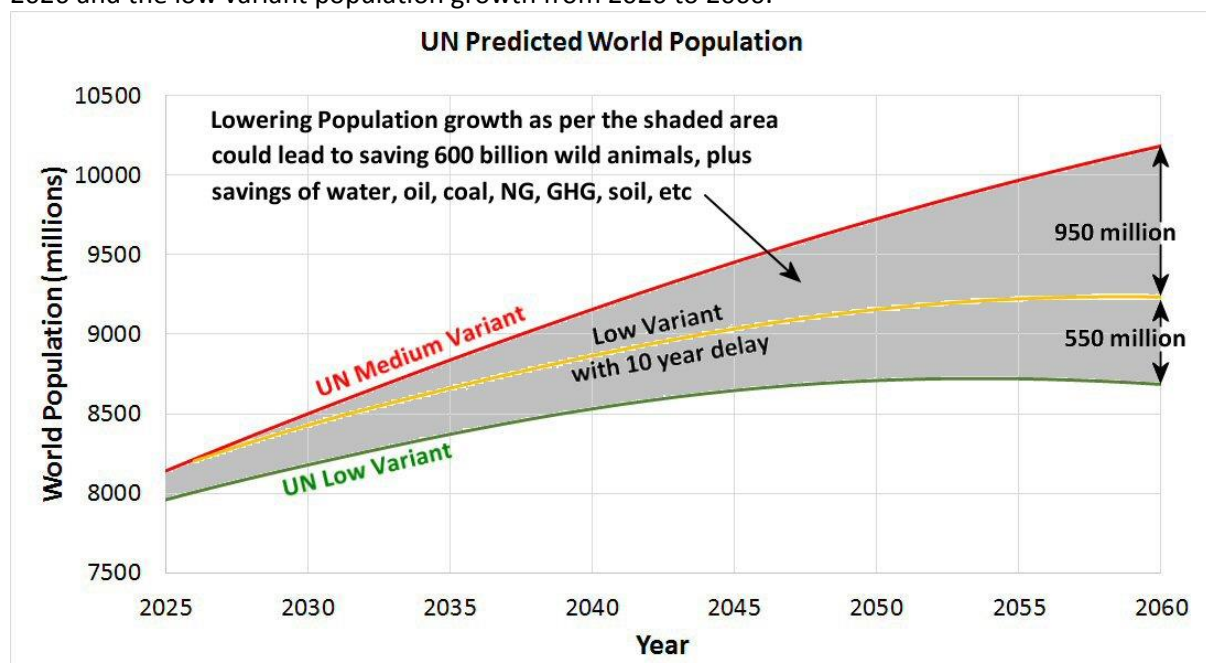


Figure 10 – A closer view of Figure 8 showing the potential reduction in population growth rate and also the impact of delaying the actions to stabilise population by 10 years. A 10 year delay would result in 550 million more people on the earth in 2060, reduce the wild animals saved to 300 billion and all the other environmental impacts would also be cut in half.

9. Resulting Environmental Impacts of population growth

There is no policy or new technology or even developing technology that comes even close to the beneficial environmental impacts of population stabilisation policies. If we make the assumption that the world started with the United Nations Low Variant population growth predictions in 2017 and continued until 2060, some examples of the environmental benefits include:

- Enough Freshwater could be saved (17,000 km³) to irrigate all the crops in North and South America for 37 years.
- This freshwater savings would benefit the High Plains Aquifer (USA), California Central Valley Aquifer (USA), North China Plain Aquifer (dropped 100m) and North India Aquifer. All of these aquifers are currently being pumped at unsustainable rates as are all of the aquifers in major agricultural areas around the world.
- Every year we lose 10 million hectares of good cropland to erosion. That soil has nutrients that have to be replaced with fertilisers and it also stores carbon dioxide reducing global warming.
- We could save 280,000 million tonnes of soil from being eroded. That is enough to offset all the erosion in China, India and the USA, (the three countries that grow the most food) for 18 years. That is enough soil to cover an area larger than Germany 300mm deep and grow 117 million tonnes of wheat per year. With 117 million tonnes of wheat we could provide a year's worth of calories for 387 million people.
- We could save 388,000 km² of old growth forest which is about 10 percent of the remaining total forest on the earth, but 20% of the total old growth natural forest left remaining.
- The IEA (2016) estimates that there were about 3 million premature deaths in 2015 which will rise to 4.5 million premature deaths by 2040 due to outdoor air pollution. We could reduce this by 650,000 premature deaths.
- We could reduce PM_{2.5} particulates air pollution by 3.4 million tonnes per year, Sulfur dioxide air pollution by 5.2 million tonnes per year and Oxides of Nitrogen (NOx) air pollution by 5.2 million tonnes per year. As IEA (2016) says: "Reducing pollutant emissions improves water and soil quality, crop yields and, in turn, food security."
- We could save 600 billion wild animals.
- We could avoid enough greenhouse gases going into the atmosphere (137 billion tonnes) that it could equal 20 years of the USA emitting zero Greenhouse gases.
- We could reduce the use of crude oil enough (133 billion barrels) that it would be equal to the USA not using any oil for 18 years.
- We could reduce the use of coal enough (29 billion tonnes) that it would be equal to the USA not using any coal for 40 years.
- We could reduce the use of natural gas enough (13,700 m³) that it would be equal to the USA not using any natural gas for 17 years.
- If we delay serious population stabilisation for 10 years, all the benefits above, for 2017 to 2060, are cut in half. That would still be much better than the way we are headed now.



Figure 11 – Cleared Forest Kalimantan, Borneo

Pollution in World: Real-time Air Quality Index Visual Map

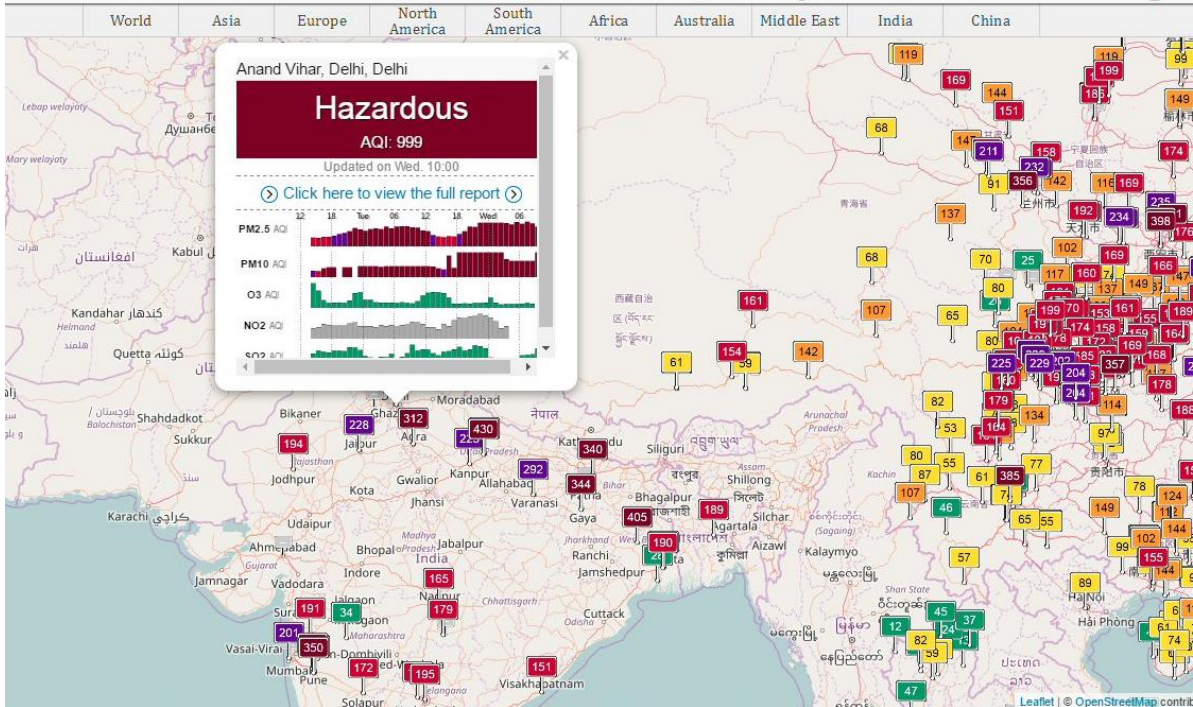


Figure 12 - Real time Air Quality Index from 16 November 2016 showing a suburb of Delhi with an Air Quality index of 999 meaning PM_{2.5} concentrations are at least 10 times higher than the acceptable standard. <http://aqicn.org/map/world/>



Figure 13 – A photo of Delhi’s famous India Gate War Memorial on an especially smoggy day. Can anybody imagine Australians or Americans living in a city with this kind of air pollution?

10. Resulting Social Impacts of population growth

High population growth impedes the development of poor nations.

- When poor countries are constantly trying to provide infrastructure, health care and education there is no time and money to invest in industry
- Rich countries are constantly looking for the best and brightest from poor countries to work in the rich countries, lowering wages and increasing productivity in the rich country. If those high quality people stayed in their home country they would be the best people to help develop that country.
- Rich countries also look for immigrants with money which would be better invested in the home country to enhance development of that country.
- High population growth pushes up energy prices. Cheap energy is a cornerstone of industrial development. Energy prices have been increasing since 2000. Continued increases in energy prices will slow the development of poor countries trying to industrialise.



Some may think that slowing development in poor countries isn't really a significant issue. It only means that a few less factories are built, that the people don't get to drive nice cars or take beach holidays. In many poor countries lack of development means the people don't have access to health care, sanitation, clean water and a fair justice system.

Stabilising population could:

- reduce food and energy prices, which would reduce poverty.
- reduce the number of premature deaths due to indoor air pollution by 500,000 by 2040.
- increase women's employment and educational opportunities.
- give developing countries the idea that the developed countries care about what happens in the whole world, not just in their own countries.

11. Proposed Steps to Stabilising Population

The first step to solving any problem is recognising that there is a problem. America and Australia do not recognise that high population is a problem in any way. The governments of both countries are actively trying to increase the size of their populations.

Reducing immigration to net zero would send the message to the rest of the world that Australia and America, two countries with strong traditions of welcoming high numbers of immigrants, were serious about stabilising population. For example in Australia, if 70,000 leave then 70,000 new immigrants would be accepted.

Extra government benefits would not be provided for more than two children in a family. For example, if there is a 10% deduction for a family with two children there would also be a 10% deduction for families with 3, 4, 5 or more children. Similarly, there would be no additional welfare payments to families after the second child. The system would only apply to children born after a date 12 months or more after the passing of the legislation.

A low carbon tax of \$20/tonne could be employed to modestly encourage less fossil fuel use. There would be no impact on the economy if the tax were offset by a reduction in income tax. For example, if the carbon tax raised 7 billion dollars per year as it did when employed in Australia a few years ago, the rates for each income bracket could be slightly lowered so that \$7 billion less was raised from income tax.

Offers to developing nations could be made by Australia and the United States to assist them in whatever ways they thought would be appropriate to reduce population growth. Options might include health clinics, birth control, girl's education and perhaps even infrastructure that might alleviate poverty. If no countries accepted the offers Australia and the United States would simply have to wait. It is unlikely that any program forced on another government would be effective. Foreign aid is always complicated and requires a different strategy for each different country. There isn't any sweeping all-inclusive strategy that will work in every country or that would gain instant acceptance for the idea of reducing population growth. Putting the offer out shows the developing countries that we are serious. Even if only a couple take the offer, the rest of the world will be watching.

12. Impediments due to our Existing Political and Economic systems

The biggest hurdle for getting political and community action on population stabilisation is that our political systems and economic systems are much more concerned with the short term than the long term. Politicians must run for office every 3 to 4 years. Business managers are required to show high returns on investments over one or two years or they either go out of business or the managers are sacked and new managers are employed. Their focus must be on the short term.

Population stabilisation won't show benefits for a long time as can be seen with the Chinese example. Now 46 years after the Two-Child policy was initiated, and 37 years after the One-Child policy, the results are hugely beneficial to China and the world. Five years after the start of the Two-Child policy (1971 to 1975) the change in China's population based on the previous trends was negligible. In America or Australia this would have been called a failed policy because it didn't show significant results in the first five years. Fortunately, the Chinese continued on with the policies and the ensuing results have undoubtedly benefited the Chinese and the world.

13. Conclusions

Stabilising population is by far the best policy for becoming more sustainable in every aspect of environmental protection. Efforts to stabilise populations should in no way preclude other methods of reducing environmental impacts and resource use. It is important to note that any methods that are developed for reducing environmental impacts and resource use, will be more effective with a lower population than with a high population. Similarly, there are also many social benefits to population stabilisation but all efforts to improve refugee security, health care, education, access to fair justice systems and other social improvements should be continued and expanded as much as possible.

The population data from China and the predictions from the United Nations show that delaying getting started with population stabilisation has significant impacts for the environment. Those delays are especially important for the survival of wild animals in the natural environment. Baby Boomers will be the dominant cohort for only a few more years. Let's hope we start to get more sustainable, start to stabilise population and get some encouragement from the younger generations so that future generations can enjoy the natural environment and the built environment to the same extent that we Baby Boomers have enjoyed it.

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Wikipedia – List of Deserts by Area
https://en.wikipedia.org/wiki/List_of_deserts_by_area

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https://en.wikipedia.org/wiki/Terrestrial_ecosystem

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<http://data.worldbank.org/indicator/AG.LND.FRST.ZS>
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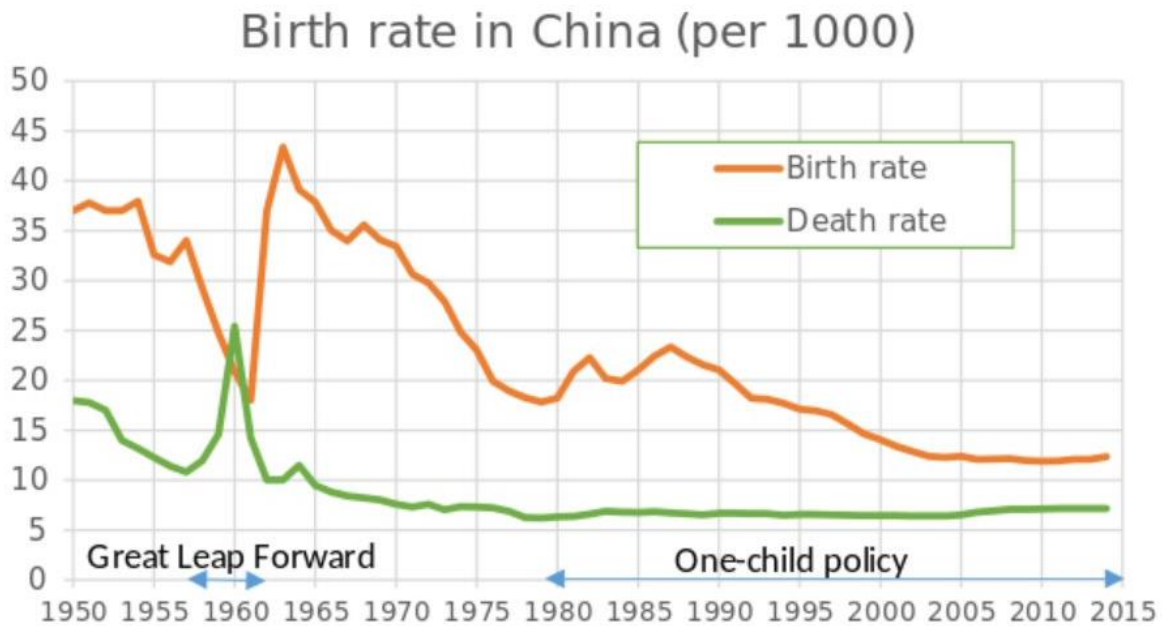
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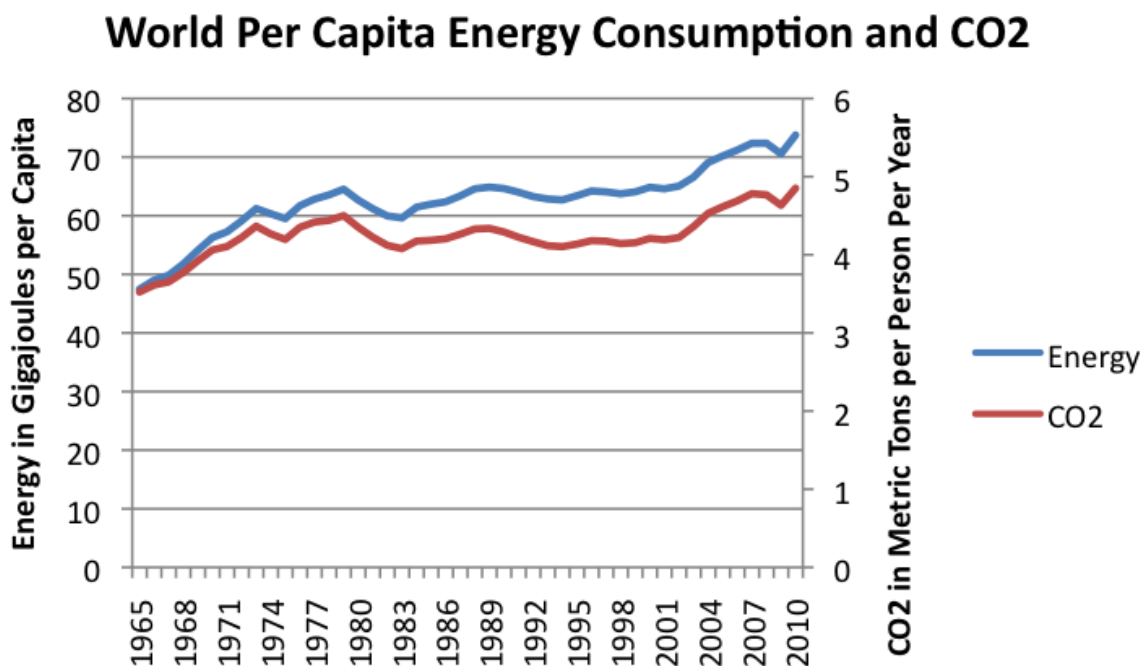
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Appendices



Appendix Figure 1 – Birthrate and Deathrate in China from 1950 to 2010

https://en.wikipedia.org/wiki/One-child_policy#/media/File:Birth_rate_in_China.svg



Appendix Figure 2 – World Energy and CO₂ generation showing that despite increases in efficiency, the world used about 50% more energy per capita in 2010 than in 1965. The graph also shows that the increase in CO₂ generation per capita lagged behind Energy consumption but not by much.

<https://ourfiniteworld.com/2012/03/12/world-energy-consumption-since-1820-in-charts/>

FACTS & FIGURES



Globally **884 million** people (one in eight) live without safe drinking water and 2.6 billion (two in five) do not have adequate sanitation.

70% of all freshwater withdrawals are for irrigation and yet 870 million people suffer from chronic hunger.



By 2050 food demand will increase by 60% and energy by 100% if current trends continue.



More than **80%** of the world's wastewater flows untreated into the environment

3.5 million

people die prematurely each year from water-related diseases

US\$2.5 trillion

economic losses from disasters so far this century – 70% relate to floods and droughts

250

More than internationally shared watercourses contribute to the economic, social, and environmental well-being of 70 percent of the world's population.

2015

water was ranked as the highest risk impacting global society by the World Economic Forum

The costs of climate change were estimated to total nearly one percent of global GDP in 2010, or nearly

\$700 billion

and this is expected to double by 2030.



New urban development between 2010 and 2030 is expected to equal what was built in all of human history.

1.3 billion

More than people lack access to affordable, reliable electricity. At the same time, energy subsidies cost a staggering \$2 trillion, when factoring in externalities.

1 billion

Over people already face water scarcity, and this may triple by 2025.



The global middle class will expand from 2 billion people today to 5 billion in 2030, fundamentally altering consumption patterns.

Appendix Figure 3 –Facts and Figures from World Water Council Strategy 2016 – 2018, Secure, Adapt, Sustain

http://www.worldwatercouncil.org/fileadmin/world_water_council/documents/official_documents/20151201_WWC-Strategy-2016-18.pdf

Philosophical

The question of who we should share the planet and its resources with is a difficult one. The following is my assessment of what the answers to these questions would be for the general population of Australia and the United States.

Q: Should we share the planet with people who help us live a better life?

A: Yes

Q: Are we currently doing that?

A: Not perfectly but in general pretty well.

Q: Should we share the planet with people who may not help us live a better life?

A: Yes, but it is hard to tell. The ones who are clearly bad we should try to eliminate.

Q: Are we currently doing that?

A: We seek out the ones who treat us badly and kill them or put them in jail or use whatever powers we have to make their lives more difficult. For the people we are uncertain about we generally take a cautious approach.

Q: Should we share the planet with other species who help us live a better life?

A: Yes

Q: Are we currently doing that?

A: Not perfectly but in general pretty well. We don't treat the animals that we eat wonderfully but we do feed them and give them a place to live. We allow some areas to stay National Parks so wild animals can live somewhat naturally.

Q: Should we share the planet with other species who may or may not help us live a better life?

A: Possibly but it is not worth a big effort by anybody.

Q: So if they die off that is okay?

A: It's not great but it isn't worth my trouble to prevent it. If we need to take some of the wild animals land we will take it to make our lives better.