THE BIBLICAL AND ETHICAL BASIS FOR ECOLOGICAL SUSTAINABILITY: Tackling Population to Benefit Planetary Ecology and Reverse Climate Change

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Abstract

The human brain, with its ability to come up with technical fixes to practical problems does not necessarily equip us to follow through with ethical solutions where needed. For this to happen, arguably we need a wisdom above our own and a motivation that is ordinarily lacking in us.

There is a Biblical basis for the imperative to maintain Earth's ecology. Other species have intrinsic value. There is a shift in Biblical focus from dependence on numbers in early times to changed hearts at Christ's coming, to achieve identifiable Biblical objectives including restoration of Creation. Discussion of population is not "off limits," within the Church, given that change of focus, and the word 'population' now features more often in UNFCCC documents.

Human population is the main driving force behind ecological imbalance, species loss and biodiversity loss in general, being the biggest multiplier of the human impact involved in the gathering and processing of resources for human use and in the generation of wastes.

In gathering resources, habitat loss is the most serious resulting problem, population being the main multiplier. Regarding wastes, Carbon dioxide is the most intractable problem, population again being the biggest multiplier. Neither does directing more money at these problems make them go away, since all money is generated in the first instance from converting natural ecosystems to productive human use, thus eroding the very biodiversity that needs to be saved.

In Nature favourable conditions lead to exponential increase in populations, This is not beyond the understanding of humans either to identify or solve in regard to the human population..

From the social point of view, a willingness to act in an ethical way to reduce family size is a major hurdle. Some helpful ways will be discussed.

Introduction

[This talk builds on a previous one given in 2014, which may be found at the weblink provided. [1] The talk aims to show that Christians are among those who have a contribution to make in solving environmental problems.]

An Introductory Story:

You may have heard the joke about the bicycle instructor, who enjoyed using his tandem bicycle (like the one in the photo) to teach others the finer points of bike riding. One day he had a new passenger and together they were going up a steep hill familiar to the instructor. The going seemed harder than usual and, when they finally made it to the top, the instructor commented, "That hill was remarkably difficult today, more so than I remember it before." "Yes," replied his new recruit, and if I hadn't kept the brakes on all the way up, we might have rolled right back down to the bottom again!"

This story mirrors the task we have when tackling the issue of human population in relation to Earth's ecological problems. [2] Conferences on environmental matters are held each year, but trying to set the focus on 'population' is likely to be hindered by setbacks.

Let us therefore identify and set aside hindrances from the start, in order to make progress towards healing of the planet.

(1) Appreciation of our Planet is Necessary

A person's ethical basis for directing their efforts will be sourced somewhere - and a good starting point is with the creation itself. Psalm 19:1 says,

'The heavens declare the glory of God.'

In a book titled, "The Privileged Planet,"[3] scientists, including Christians, examine the uniqueness of our planet for the evolution of complex life and show how our position in the galaxy enabled the observations that lead us to exactly that conclusion. Assigning a conservative chance of just I in 10 for any necessary condition for life, such as the existence of liquid water or the need for a large satellite such as our Moon to stabilise the tilt of a planet's axis, and estimating a minimum of say 15 such conditions all needing to be present at the same time, the odds against our own amazing Earth existing are indeed astronomical. It would take around 10,000 galaxies like our own for there to be an even chance of just one habitable planet like the Earth occurring around one star out of a total of 10^{15} stars in all those galaxies.

(2) Correct understanding of 'Rule'

Our Earth is an amazing place and, for the person who identifies themselves as a Christian, the Bible has something definitive to say about our ethical role in relation to caring for nature. This role is first mentioned in Genesis, where humans, both male and female, are given delegated authority under God to care for the other species.[4]

Then God said, "Let us make man in our image, in our likeness, and let them rule over the fish of the sea and the birds of the air… over all the earth …" (Gen 1:26)

What can we make of the word, 'rule'? There are two ways to interpret a Biblical passage; one is called 'exegesis' and means correctly unpacking what the original text actually meant. The other is called 'eisegesis' and means incorrectly ascribing to a text a meaning we'd like it to have. Many have wanted 'dominion / rule' to mean exploitation; allowing us to take whatever we want from nature. This is an example of eisegesis. What, however, does exegesis reveal about this passage? In my first talk at the ORT, I discussed how the Hebrew verb translated as 'rule', 'radah'[5] derives from a noun RADA, meaning 'a point higher up on the root of a plant.' It's the place at the top of the root from which shoots radiate above ground and roots radiate below the soil. It is also the centre of strength for the plant as a whole. The verb 'radah' that comes from it is forceful and defines our ecological role in relation to the rest of life on Earth – we are to be the centre of strength[6] for all living things in the biosphere. Biblical ethics are on the side of nature as a whole as seen in this ecological image in Genesis. We should therefore set aside any hindrances arising from eisegesis with this passage, in order to make progress.

(3) Mathematics is essential

Mathematics, used accurately, can remove other difficulties. There is often debate over which is more important to tackle; population or per capita consumption, since it is self-evident that our total impact is one multiplied by the other:

TOTAL Impact = Population X per capita Impact

Here's a simple example of multiplying several figures together: 2, 3 and 10. It's easy; 2 X 3 = 6 and 6 X 10 = 60. Here's the question: which multiplier, 2, 3 or 10 contributes most to the magnitude or size of our answer? Clearly it's the 10 that results in such a large answer, as it's the biggest multiplier. Now,

let's see how this helps answer our question – which is more significant - population or per capita consumption?

Our data:

In the 20th Century, consumption rose by a factor of 10. [7] By the year 2000 AD the human population was using ~2.7 gha per capita. [8] In 1900 AD consumption would have been approx. 0.27 gha each, a tenth of that.

Also in the 20th Century population rose by a factor of 4, from around 1.6 billion in 1900 AD to 6 billion by the year 2000. [9] To ask which multiplier had the bigger effect: consumption at 10 times or population at 4 times, is like trying to compare 'apples' with 'oranges.' We can, however, make a comparison by using ecological footprint.

Our total ecological footprint, measured in global hectares [10] in 1900 AD and again in the year 2000 can be calculated as follows:

1900 AD: 0.27 X 1,600,000,000 = 432,000,000 (gha)

2000 AD: 0.27 X 1,600,000,000 X 10 X 4 = 17,280,000,000 (gha)

Which multiplier contributes most to the magnitude of the answer? As always, it's the largest multiplier, namely the 1.6 billion that was the size of the population at the start of the 20th Century, because it contributes most to the size of the impacts for both dates. If we think the fact that consumption rose 10 times proves it more important than population, which rose only 4 times, the effect is to put the brakes on our thinking and slow progress concerning the major problem, which is population, because population itself is the biggest multiplier.

The blessing, "Go forth and multiply," also found in Genesis 1, [11] applies to all species; plants, animals and humans. Its purpose is to prevent the species dying out; however when a species experiences favourable conditions and consequently increases in numbers, the threat to its existence comes not from a failure to multiply but from a likelihood that its resource base will collapse or it will perish from its own toxins. Where humans are concerned, many other species are also impacted due to our growing global footprint. In addition are other factors not yet included in the calculation of global footprint, such as land that has become radioactively contaminated or ecosystems in water and on land degraded by the process of fracking and oceans polluted by plastics. Our survival no longer depends on population growth but on population stabilisation followed by decline and this is absolutely essential for the welfare of other species also.

(4) Intrinsic Value of Other Species

Further on in the Bible, we learn that nature has intrinsic value, i.e. value in itself quite apart from any usefulness to mankind. We ourselves may assign a weight of 100% to the value of humans and 0% to the value of other species but we see a different picture in the Old Testament book of Job, known for his example of patience in suffering. Although Job finally gives way and complains to God about the injustice of his situation he is pulled up short when God opens his eyes to the creation around him [12] and asks, "Where were you when I laid the earth's foundation? … Have you ever given orders to the morning? … Can you bind the beautiful Pleiades? Can you loose the cords of Orion? (i.e. make stars leave their fixed positions in the sky)… Do you hunt the prey for the lioness? … Do you give the horse his strength or clothe his neck with a flowing mane (and so on). Given this new perspective, Job's response is, "I repent in dust and ashes." [13] It's clear from the Old Testament book of Job that Biblical teaching is neither self-centred nor anthropocentric. We can set aside this hindrance to looking after nature.

(5) Biology and Exponential Growth

Biology shows how any species, whether plant, animal or bacteria etc., will increase in numbers exponentially, if given favourable conditions.

Suppose that, in a bottle of chicken soup kept at a suitable warm temperature, there is just one bacterium able to divide every 20 minutes.

After 20 minutes there will be 2 bacteria, both able to divide every 20 minutes

After 40 minutes there will be 4 bacteria

After 60 minutes (1 hour) there will be 8, and so on.

When will the number of bacteria pass one million? Just 6 hr 40 minutes later.

Then, after another 20 minutes, instead of 1 million there will be 2 million (unlike the first 20 minutes, when the population went from just 1 to 2 bacteria). Remember that each bacterium is behaving no differently from any other, nor is it varying its behaviour, that of giving rise to two bacteria at each 20 minute time interval. In the same way, when we compare ourselves to others in society we may come to the conclusion that we behave no differently, so there's no problem for society as a whole to solve. What's the error here? The error lies in paying insufficient attention to totals at any given time.

Suppose the bottle of warm chicken soup takes a day to fill with bacteria and by midnight the bottle is full. When is it half full, remembering bacteria double in numbers every 20 minutes? It will be half full at 20 minutes before midnight, a quarter full at 11.20pm and an eighth full at 11 pm. Imagine an average bacterium in the bottle, which has taken 23 hours to become just one eighth full. Would it realise time was short, or that there was an hour left before food ran out or accumulating toxins poisoned the whole population? Probably not - and that's why an understanding of exponential growth is important. The late Professor Al Bartlett, whose lecture, "Arithmetic, Population and Energy" has been viewed millions of times on YouTube, [14] said that, in his opinion, the greatest failing of the human race was its failure to understand the exponential function.

Just as in the example of the bacteria, any species of plant or animal experiencing favourable conditions, will increase in numbers exponentially. The same is true of humans in recent times due to better medical care and access to fossil fuels that raise our living standards, so our population is increasing exponentially.

(6) Some Ethical Considerations

Anyone quoting "Go forth and multiply" passages[15] from the Old Testament to support human population growth makes the mistake of quoting the Bible out of context. Biblical writings, many of them with roots more than 3000 years old, [16] come from a time when human population stumbled along at a low level, much lower than today [17] and when death rates were about equal to birth rates. As recently as the 19th Century in Europe it was common for families to have over ten children but have only a few survive. In Sydney too, there is a cemetery where 4000 people were buried between 1846 and 1950; of these, over 2000 were children under ten years of age.[18] These children never gained maturity so did not add to growth in the world's population.

Some people say everyone has the right to have as many children as they want but this "right" overlooks the right of others to have a healthy and beautiful natural environment and gives other species that will consequently lose their habitats no rights at all. 'Rights' also imply obligations to the other living things on the planet. A relevant biblical passage from Philippians 2: 5-7 says,

'Your attitude should be the same as that of Christ Jesus; Who, being in very nature God, did not consider equality with God a thing to be grasped, but made himself nothing, taking the very nature of a servant …(etc)' (Philippians 2:5 – 7)

Although Jesus had rights above ours He did not assert them. If a person foregoes certain perceived "rights," to as many children as they want, they can, as a result, be a blessing to the planet's ecology.

Currently, human population is rising by about 10,000 people an hour.[19] That's not 10,000 births but the figure we get by subtracting deaths from births. Some people say "Nature has a way of evening things out," implying we don't have to do anything. However, this apparent 'solution' is no solution at all when we realise that population is increasing at present because birth rate exceeds death rate and without action to reduce birth rate, the only way population can decrease is if death rate overtakes birth rate. This happens at any time or place in history where human numbers exceed their resource base and famines, epidemics, wars and pestilence result. Whilst we cannot apply this retrospectively, if people choose smaller families and encourage others to do so, it is a practical way to solve the problem and express our gratitude to God for the blessings of better medical care, access to fossil fuels etc., which provide our favourable living conditions in the first place.

The ethical thing to do is to make it our top priority to avert the problem, by reducing birth rates to live within the limits of the planet for the benefit of all life on it. A quote from the New Testament is,

"Stay always within the boundaries where God's love can reach and bless you." (Jude verse 21 - Living Bible)

(7) Biblical Solution – the Crux of the Matter

Waves of humanity, flooding over, say Europe for example, [20] are caused, among other things, by population increase beyond levels people already knew to be sustainable locally. Without the early preventive action needed to counterbalance this by greatly reducing family sizes, survival rates suddenly decline, having been maintained temporarily by medical intervention and food aid.

Where exponential growth is involved, calamity impacts us suddenly.

The human brain, with its ability to come up with technical fixes to practical problems does not necessarily equip us to follow through with ethical solutions as needed. Unwillingness to take action is the main reason for putting the brakes on where population is concerned.

Family is a key emotional need for all of us but Jesus said,

"Who is my mother and … my brothers? … whoever does the will of my Father in heaven is my brother and sister and mother." (Matthew 12:48)

Human pride is also a factor to overcome. We are familiar with the idea of "eugenics," which in practice means promoting the reproductive rights of one group over others. The first, to which we ourselves happen to belong via family, tribe, nation, race, religion etc., is based on identifiable and supposedly superior characteristics and then allows us to place restrictions on members of any other group. There is no basis in the Bible for considering one group superior to any others where the love of God for us is concerned. [21] For this problem to be resolved, we may need wisdom above our own and a motivation ordinarily lacking in us.

Proverbs says,

"Trust in the Lord with all your heart and lean not on your own understanding." (Proverbs 3:5)

In the Old Testament, the nation of Israel was selected to be a light to the nations around them. [22] The greater their numbers, the stronger that light, provided they faithfully conveyed God's holy character and His requirements to the other nations. God wanted to bring other nations to himself too.

However Israel, like humanity in general, repeatedly failed and that failure was in relation to nearly every command God gave them. God's plan to overcome this, revealed initially through the Old Testament prophets, was exactly what was needed, that is a change of heart. [23] His plan was to bring people back to himself through a loving response to Jesus. In John 12:32, Jesus says,

"And I, if I be lifted up from the earth (i.e. die on the cross) will draw all men unto me." (John 12:32)

Such a change of heart is needed for humanity to look after nature, which, according to Scripture, is included in God's plan of salvation. [24]

Population needs to be seriously discussed within the Churches. Some Catholic leaders now acknowledge human population as an environmental problem.[25] Pope Francis said in February this year that preventing pregnancy is not 'an absolute evil'. [26]

(8) Need to Reduce the Threat to Biodiversity

There would be no problem in their being 7.4 billion of us if our per capita consumption was as small as, say, that of an ant. However, our individual impact is large, because we are large warm-blooded animals requiring a lot of energy and we are able to modify the environment in our favour – consider the air-conditioned high rise buildings built and maintained by fossil fuel energy. We each remove a large amount of resources from the natural world to meet our needs for food, clothing, shelter etc., and do so at a cost to the planet's ecology. In the 20th Century, humans took an additional 16.8 billion global hectares away from Nature, adversely affecting other species by impacting the ecosystems on which they depended.

The 2016 edition of the National Footprint Accounts released by the Global Footprint Network shows that the world population demands 64 percent more than nature can regenerate in one year through overfishing, over-harvesting our forests and, primarily, emitting more carbon dioxide than our ecosystems can absorb. The effects include wildlife habitat loss and fragmentation, collapsing fisheries, and climate change. [27]

A developed society is like an octopus with tentacles extending to all parts of the globe, gathering in resources. Areas in distant places supply us with agricultural, forest, marine and mineral produce, impacting nature and effectively shrinking a country's borders for locals in those areas where these products originate. It is because of our numbers that biodiversity is the main casualty. It took all of human history for population to reach 1 billion, in 1804. Over 6 billion people have been added since then, the last billion in only 12 years. We have, as a result of impacting ecosystems, stopped major evolutionary pathways in their tracks. [28] There may no longer be a place to which certain animals in a zoo, for instance, are adapted. Even Darwin, born two centuries ago in 1809, with his insights into evolution and his familiarity with Malthus, never envisaged the present scale of biodiversity loss at the time he published "The Origin of Species" in 1859. [29] [As a footnote it may be noted here that there is a unification of Science and religion in Darwin, who wrote in "The Origin of Species" that he saw no reason for his Theory to be a stumbling block to anyone's faith. A thorough reading of his book shows this was certainly not a problem for his own faith; yet this aspect of the book seems to have been overlooked since its publication.]

The human species alone now needs over one and a half 'planet Earths' to meet its requirements. Some claim Earth has enough resources for the population and 'sharing' is the problem. It is self-evident that the Earth has enough resources for every person alive, because wherever resources fail, people die and are no longer counted among the living. On that basis there will always be enough for everyone 'alive.' However we need to consider nature as well, especially now that the human population has become ecologically unsustainable. This means terms like "Ecologically Sustainable Development" (ESD) are a contradiction in terms unless a development plan includes first lowering population.

Every reduction in planned family size by even one birth helps by collapsing a chain reaction of births that follows after it, similar to the multiplication of bacteria.

(9) Perspectives from Chemistry and Physics

Chemistry and Physics can help us understand the impact of population as it relates to global warming. Carbon dioxide is by far the biggest contributor, due to the large amount released by the total human population to avail itself of cheap energy. [30] Some years ago Sir Richard Branson initiated a competition offering a reward to anyone who devised a solution to the growing problem of atmospheric CO_2. However, his money was safe in this instance. When Carbon, e.g. in coal, combines with Oxygen to make CO_2, the reaction is exothermic, that is it gives out energy. First the bond between the two atoms in the O_2 molecule has to be broken and this requires a certain amount of energy, known as activation energy. Next, the two oxygen atoms combine with Carbon making CO_2 and this releases more energy than was used to break the O-O bond - an extra 226 kJ per mole of CO_2 formed. [31] Obtaining this extra energy is the purpose of burning carbon based fuels. The resulting CO_2 is a very stable compound and needs a correspondingly large amount of energy if this process is to be reversed. We can't use fossil fuels to carry out this energy intensive job. However, nature does it freely through photosynthesis, lowering the activation energy required in the process by using enzymes, which are organic catalysts. [32] We therefore depend fully on green plants on land and in the sea to remove CO_2 from the environment. The most threatening aspect of global warming is when photosynthetic enzymes are moved outside the temperature range in which they function. In coral bleaching events, for example, corals expel their symbiotic algae, the zooxanthellae, rather than let them die in the polyps. [33] If temperatures do drop there may be an opportunity for the algae to migrate back otherwise bleaching will be permanent.

Fewer people these days argue that global warming is not a problem. Those who do, often point to a levelling out of atmospheric temperatures in spite of rising CO_2 emissions. [34] However, this levelling can be explained by Physics. The melting of polar icecaps, which act like ice blocks in a drink, keep the planet cool. We need to understand of the concept of latent heat. [35] If solid ice absorbs heat at a constant rate, its temperature rises until it reaches Melting Point, 0° C. Temperature remains at zero while the heat input, still constant, continues melting the ice. After the ice has all turned to water, temperature resumes a steady rise until it reaches Boiling Point, 100° C. Once again temperature levels out while water turns to steam, a gas.

Latent heat is the amount of heat taken in or given out to change state e.g. from solid ice to liquid water or vice versa and from water to steam and back again. Atmospheric temperatures are showing a levelling out relative to increasing emissions because the melting polar ice is absorbing heat and countering effects of global warming. However, it takes 80 times as much heat to melt a cup of ice at 0° C to water, still at 0 degrees, as it takes to raise the temperature of that cup of water through 1 degree Celsius, say from 20 to 21 degrees; [36] and that amount of heat would raise the temperature of the water from 20 degrees C though the 80 degrees it needs to reach Boiling Point at 100° C. The planet's increasing CO_2 emissions [37] still result in a growing amount of trapped heat energy, with a proportion of that heat warming the oceans and most of the rest melting polar ice.

We don't notice much change right now because the Arctic and Antarctic icecaps are like two ice blocks in a drink, with latent heat of melting keeping the temperature deceptively steady.

Three Success Stories

What have we established? That Maths and Science both explain why population is the major factor behind the loss of the Earth's biodiversity and the magnitude of the global warming problem; that the Christian faith, despite misguided biblical interpretations of the past, does not provide a hiding place from reality; rather giving us an imperative to act. Finally, we need to identify solutions, using a combination of disciplines.

To be part of the solution it's helpful to look at what solutions are effective and work with them.

There are 3 success stories I would like to share briefly.

The first is from Bangladesh, where fertility rates have dropped in the past 30 years or so. In 1978, the government of Bangladesh launched the delivery of family-planning services through family-welfare assistants assigned the task of reaching out to village women, door to door. The goal was to reduce the birth rate. Health workers were sent out every two weeks to deliver messages about contraception, distribute contraceptives and motivate mothers to use them. The health workers addressed the women's fears and discussed any possible side effects of contraceptives. The approach proved to be successful. [38] The nation reduced its total fertility rate from 6.9 in 1970 to 3.3 children per woman by the mid-1990s. [39] In 2014 the TFR was estimated to be 2.4 children per woman. [40]

The second success story is a program set up by the British organisation, "Population Matters." Known as "PopOffsets," [41] it accepts donations which are then forwarded to successful FP projects in both developed and developing countries. PopOffsets does not support abortion programs so has wide community acceptance. Gifts may be straight out donations or calculated to offset specific carbon emissions by individuals or organisations.

Research carried out by PM has established that family planning is the cheapest way to reduce carbon emissions. To offset 1 tonne of carbon emissions requires only [42]

£ 4 (GBP) if spent on family planning; BUT

£ 8 if spent on tree planting

£ 15 if spent on wind power

£ 31 spent on solar energy and

£ 56 pounds on hybrid vehicle technology.

Further, the reduction in births helps the planet preserve biodiversity.

Sir David Attenborough is one of several eminent patrons of Population Matters. PopOffsets can be contacted through their website at www.popoffsets.com and their carbon calculator used as the basis for a donation.

The third and perhaps most encouraging solution, involving the Arts rather than Science or Maths, is a method developed by the American organisation, the Population Media Center (PMC). [43] Run by Bill Ryerson, a trained ecologist whose motivation is the welfare of nature, PMC has programmes in many developing countries, presenting radio dramas running over several months, featuring local characters who go through various crises to which FP knowledge may be relevant.

Prior to developing such radio dramas or 'soaps' PMC obtains government permission to research existing levels of uptake of FP through local clinics and to identify any cultural or religious taboos etc.,

within the country. Then they produce and run the radio programmes, which are very popular with listeners, and afterwards again measure uptake of FP services at the clinics. Always the level of uptake has improved and, when questioned, people cite the radio dramas as the reason they chose to visit the clinic. PMC receives many grateful letters from those whose problems have been resolved through the radio dramas.

For the sheer gratitude of its audiences, PMC's work is a winner.

Conclusion

We can be certain of this; that we need to tackle population both as individuals and collectively to preserve planetary ecology and reverse climate change. Whatever other measures are used, all will ultimately fail without this change. There is an ethical basis for action and, for Christians, that basis is in the Bible. The lesson from the the tandem bicycle story is that, in this uphill struggle, we need to identify from the beginning those ideas that put the brakes on our efforts.

I would like to conclude with the words of Charles Darwin, who was both a pre-eminent evolutionist and also a Christian, where he says concerning his Theory, in the last paragraph of "Origin of Species,"

'There is grandeur in this view of life, with its several powers, (i.e. its diversity) having been originally breathed by the Creator into a few forms of life or into one; and that … from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved." [44]

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FOOTNOTE:

As a footnote it may be noted here that there is a unification of Science and religion in Darwin, who wrote in "The Origin of Species" (p. 432) that he saw no reason for his Theory to be a stumbling block to anyone's faith. A thorough reading of his book shows this was certainly not a problem for Darwin's own faith; yet this aspect of the book has been largely overlooked since its publication.

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CALORIE: The energy needed to raise the temperature of 1 gram of water through 1 °C

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