ABSTRACT
The directions taken by nations are often determined by their faith narratives. Such narratives become embedded in the national psyche and are accompanied by acceptable ways of expression and behaviour. The “Go forth and multiply” passages in the Bible, together with the “Have dominion/rule over” reference in the first chapter of Genesis have been widely circulated in the societies of many countries, variously interpreted and discussed. Biology reveals that any species, whether plant, animal or other life forms, will increase in numbers exponentially if given favourable living conditions. While Humans may be the only species to appreciate this mathematically, our understanding of the problem has not automatically brought about an effective solution to our own exponential human population increase in modern times.

Revisiting our interpretation of the Biblical faith narrative, for example as it relates to the above quotations, may reveal some helpful insights regarding the directions our efforts may take to find acceptable solutions to the waves of migrants flowing into Europe, the broad scale degradation of the environment and the long-term future of the only planet to which all life as we know it, is adapted. Matthew Sleeth, American medical doctor, in his book, “Serve God, Save the Planet,” provides a helpful starting point, through his explanation of the term ‘rada’ from which the Hebrew word commonly translated as ‘dominion/rule’ is derived. With the help of Biology, this reference can be seen as being truly ecological, placing humans in the role of the ‘centre of strength for the biosphere,’ rather than as its ‘rightful owners.’

INTRODUCTION
The directions taken by nations are often determined by their faith narratives. Such narratives become embedded in the national psyche and are accompanied by acceptable ways of expression and behaviour.

A society may give significance to certain days, seasons or past events; for example, for Christians, events such as Christmas or Easter have special celebrations. It may hold gatherings at which stories are told that refresh the reason for such commemorations. These stories have an effect on the society, for better or worse depending on the meanings assigned to these events.

When a belief system arrives in a new area, those with power under a previous system may oppose it, unless genuinely converted. Very often the meeting of cultures results in a syncretism of ideas that has elements of both. For example, in Britain, Easter rabbits became part of Easter activities even though unrelated to it. In Papua New Guinea, following the arrival of European missionaries, when a person became sick they might hedge their bets by turning up at a clinic for western medicine, by praying for healing and, going to a sorcerer for
traditional herbs and magic words. So, separating local culture from the basic faith narrative in a person’s mind may not always be easy.

Throughout history, the Christian church has often taken the lead in solving social problems. First, the Church brought education so that people could read the Bible for themselves, next it organised health care, because Jesus healed, then came the development of a legal system modelled on the Commandments and other Biblical precepts, to promote justice, and so on. Currently, a global issue facing us is the environment and, to tackle it the Church, finding itself a late starter, needs a fresh look at its faith narrative. In the process it may also need to cast aside elements of syncretism, to remove any irrelevant cultural attitudes from its message and get back to basics.

**THE ROLE OF HUMANS IN RELATION TO NATURE**
I’d like to make a start on the environmental aspect by commenting briefly on those well-known and much-discussed quotations from the Bible found in Genesis; namely the “Have dominion/rule over” reference and secondly the “Go forth and multiply” passages, notably found in the first chapter of Genesis and also in Chapter 9 in the story of Noah after the Flood.

These quotations have been a source of misunderstanding both from within and outside the Church, but I hope to show this misunderstanding is not necessary.

A rule for interpreting any Biblical passage is that a passage must be taken in its proper context. The context of the “Go forth and multiply” passages is that they were written at a time when world population was going along at a low level, and they appear in stories about times when there were close to zero populations. In this context, “Go forth and multiply” was appropriate.

There are no “Go forth and multiply” references in the New Testament. When Jesus was on Earth, the population was higher than in Old Testament times but not significantly so. Yet Jesus told his disciples to “Go into all the world and make disciples of all nations” and he did not tell the disciples to bring lots of little Christians into the world in order to achieve this. The spread of the Good News of God’s salvation was not through procreation, which had been a strong emphasis in the Old Testament, but through new creation, e.g., Jesus’ words to Nicodemus, “You must be born again.”

Two other significant points are (1) that “Go forth and multiply” is a blessing, not a command, so we cannot claim we are being obedient to God by having many children; nor is a blessing an entitlement, since blessings come by the grace of the Giver and in His proper
Also, (2) the same blessing was given to the animals in Genesis 1:22, before it was given to humans in verse 28 and earlier, in Genesis 1:11, provision was made for plants to reproduce even before animals. The result was a balanced ecosystem with Producers (plants), Herbivores and Carnivores (the animals) thriving before humans arrived on the scene. “Go forth and multiply” originally referred to all living things.

Regarding the “have dominion/rule over” reference, which is in the first chapter of Genesis, the Hebrew word we translate as, “have dominion/rule” is derived from a noun, ‘RADA,’ for which there is no English equivalent, so translation is tricky.

‘Rada’ means a point higher up on the root of a plant. It is the point from which shoots radiate above ground and roots radiate below the soil (‘rada’ – radiate). It also happens to be the centre of strength for the plant as a whole. If we want to remove a plant from the ground, we position our digging tool below ‘rada’ and simply lever the whole plant out of the soil. The plant comes out in its entirety because rada is its centre of strength and holds it together.

What the text is saying here is that, just as ‘rada’ is the centre of strength for the plant as a whole, so the human species is meant to be the centre of strength for all life in the biosphere.

The Hebrew text uses the verb ‘RADAH’ which is derived from the noun ‘rada,’ so this is an action – “to be the centre of strength for all other species.” The conjugation of the verb in the Hebrew is the Jussive, which is forceful and expresses a strong wish / mild command. It is, therefore, God’s strong wish for the human species to look after the rest of the plant and animal species in creation. It is a directive unique to humans and, for us, it ‘comes with the territory’ of having been created human. God gave us the capability of looking after all the other species. We are the only species with such a general capability, and we are to exercise that power with delegated authority under God, to the benefit of all life on Earth.

The concept of ‘rada’ is truly ecological. Dr Matthew Sleeth, an American medical doctor, in his book, “Serve God, Save the Planet,” says there is no sense of ownership in ‘rada,’ nor of unrestricted use. From Biology, we know that, while rada holds the shoots in position above ground, it also depends on them for the products of photosynthesis; and while ‘rada’ is the origin of the network of roots below ground, it also depends on the roots for water and mineral salts.

If we are tempted to think being made in the image of God makes us lords of creation, we need to remember that Jesus was the perfect Son of God and He was a servant Lord.
**Human Actions Towards Nature**

While there is probably broad agreement that humans have a caring role towards nature, the acquisition of our daily bread, our needs and wants, seems to bring us into conflict with the other species that share the planet with us.

Theoretically this conflict is avoidable, because if we take fish from the ocean, lakes, and rivers, they can replace themselves by breeding; if we cut trees to build homes for ourselves, they can grow again from seed, if we clear land to grow food then leave it fallow or, in the words of the Bible, we give the land its Sabbath rests to recover its fertility (which would include the slash and burn practices of native peoples allowing tropical forests up to 40 years to regrow between uses) humans could live without destroying natural ecosystems. They are, after all, renewable resources.

What brings us into conflict with nature, especially in modern times, is the exponential rise in human numbers, well exceeding the sustainability of our renewable resource base.13

Biology teaches that any species, whether bacteria, plants, or animals, will increase in numbers exponentially if given favourable living conditions, such as the supply of water and food, right temperature range, lack of competitors and predators, etc. For example, if 1 bacterium capable of dividing every 20 minutes is given favourable conditions by drifting into some warm chicken soup standing on a stove then, in less than 7 hours it can multiply to become 1 million bacteria. Then, just 20 minutes after that, 1 million bacteria will double to become 2 million and so on. Unlike the first 20 minutes, when doubling meant an increase of just one bacterium, by 7 hours doubling means an increase of I million in the same time.

The late Professor Albert Bartlett, formerly of Colorado University, whose lecture, “Arithmetic, Population and Energy”14 has been viewed millions of times on YouTube, stated that, in his opinion, the greatest shortcoming of the human race was its failure to understand the exponential function.

In modern times, humans have experienced favourable living conditions relative to the plant and animal species that share our planet. Better medical care has lowered death rate, and the availability of fossil fuels has raised living standards. Exponential growth has consequently set in, and human populations are increasing at unprecedented rates. There is no longer enough time for nature to recover from the process of supplying human needs for food, clothing, shelter and energy supplies. Neither can the wastes produced along the way be absorbed through natural cycles. At the current rate of increase, the human population is set to double in less than
one lifetime, and we are looking at an additional 7.4 billion in around 62 years because 7.4 billion is the base number we are building on.\textsuperscript{15}

In the 20\textsuperscript{th} Century, the human population went from around 1.6 billion to 6 billion, up four times.\textsuperscript{16} In the same time, our per capita ecological footprint went from around a quarter of a hectare to 2.7 global hectares per capita, up ten times.\textsuperscript{17} A large percentage of this is needed as living forests to absorb our CO\textsubscript{2}.\textsuperscript{18} There aren’t enough plants on land or in the oceans to take up the quantity of CO\textsubscript{2} we are producing, and now we would need over 1.6 planets to sustain the human species alone.\textsuperscript{13} Meanwhile, we are eating into the only remaining biological ‘capital,’ as we have long ago exceeded the number of humans that would allow renewable populations of plant and animal species to thrive. Also, this calculation makes no provision for the needs of other species to have their own habitats.

Overpopulation inevitably brings us into conflict not only with nature but with each other, through the process of accessing resources from elsewhere, often from territories others have traditionally relied upon to meet their own needs. Trade deals that favour one party over another are a symptom of the inequality that increasingly accompanies overpopulation and which breed resentment and discontent. If the stories of the rationale behind some terrorist movements are heard, real or imagined inequality is bound to surface. Those not inclined to violence simply attempt to migrate in the same direction as the flow of their resources, hopeful of gaining some benefit from them through value-added jobs or handouts in the cities or developed countries which are the destinations of those resources.

Few people fail to recognise the environmental disasters we face for what they are; calamities for humans and all other living species alike. So, if we agree that what is happening to the environment on which all life depends is a disaster, how may we proceed to correct it?

**THE SAME FAITH NARRATIVE BUT A DIFFERENT EMPHASIS?**
If “Go forth and multiply” was appropriate 3000 years ago or earlier, when human populations were a small percentage of what they are now, then the converse is true today. We need to turn around the exponentially increasing human population graph and aim to reduce family sizes globally and locally for the sake of other species, to restore nature to health and give the land its accumulated ‘Sabbath rests’\textsuperscript{19} and then it will follow that all including the human species may benefit. For this to happen, we must put aside the cultural belief that the world is ours to exploit and that we may take from it what we please. This behaviour was typical of the way colonial powers acted in the past and continues under trade agreements today but is
unsupported by the Biblical narrative, which tells us the Earth is the Lord’s.\textsuperscript{20}

Reducing family sizes to appropriate levels does not come easily or it would have already been done. We need to clear up some very real difficulties.

First, family is the mainstay of most of us. Our emotional well-being depends on relationships; parent-child, husband-wife, father, mother, etc. However, having fewer children does not do away with this supportive structure. Indeed it provides opportunities for extending care to others we might not normally have time for. Jesus said, “Who is my mother and who are my brothers? … whoever does the will of my Father in heaven is my brother and sister and mother.”\textsuperscript{21}

Second, our efforts in helping people have traditionally been directed towards saving life and improving living conditions. We find activities like health care and charitable work rewarding. Yet the result of these commendable efforts has been a massive increase in human survival rates, yielding an unsustainable population which, we now know, has set nations up for suffering on an unprecedented scale. We are witnesses to heart-rending stories on the news and in documentaries as the usual means that nature uses to curb over-population come into play. For humans, this means food shortages, disease, warfare and the pestilence that ensues when ecosystems move out of balance. Even scientists are using the picture of the “four horsemen of the apocalypse” from the book of Revelation\textsuperscript{22} to describe the scale of what lies ahead. This illustration need not be seen as mysterious, as it happens regularly in nature to a population that exceeds the carrying capacity of its living space. Famine arrives first; then due to poor nutrition, disease is second, next due to degradation of the land, pestilence arrives, taking out what little productivity remains and finally conflict, or fighting over diminishing land and resources. Death rate climbs and ecological balance is restored – but in the worst possible way because, as Professor Bartlett put it, we failed to understand the exponential function (and act appropriately).

Some look at predictions for the future and say world population will peak so we do not have to worry. However, the reason it will peak if we take no particular remedial action to reduce birth rates is that environmental degradation due to overpopulation will cause death rate to catch up with birth rate, and we will lose even the current battle which is aimed as it always has been, at increasing the survival of our own species.

We need a different emphasis, namely to counterbalance our improved survival rate with a much lower birth rate. While not neglecting factors that increase survival, we need to
voluntarily decrease fertility rates, including those of western nations whose high per capita consumption eats into the natural environment at a faster rate. We need to stabilise then lower fertility as our top priority in line with our duty of care for the biosphere and our own species.

There is a cultural myth that no one has the right to tell anyone else how many children he or she may have. However, societies place limits on the number of passengers a bus, a boat or an elevator may carry. We are all in the Ark, so to speak, together and what others do impacts on us all. So, we have a responsibility to enlist the willing support of all our fellow passengers to reduce family sizes, starting with raising society’s awareness of the need for smaller families.

Another myth is that we need more young people to look after an ageing population. However, young people can only look after the old if they have sufficient land they can work or jobs based on resources but land and resources are declining per capita as population rises. Jobless young people cannot look after themselves, let alone the elderly and the Earth’s population is currently rising at around 9,000 net per hour.23

**Hope for the Future**

There are reasons for hope in the future, and the first arises from this; that our present predicament is largely due to two good things. It is due to the hard work of dedicated medical people that we have increased survival rates in modern times and it is due to the hard work of engineers and other technical people who have harnessed the power of fossil fuels, that we have higher living standards. Fossil fuels are not bad in themselves, only in the scale of their use, population being the multiplier. Hard work lies behind good education, fitting people for jobs which then enable them to take resources from the environment at a cost to ecosystems. Dedication lies behind the success of peacemakers who work to eliminate conflict and so on. If the hard work of good people has landed us in this predicament, the hard work of good people can get us out of it.

In this, as always for societies in which the Bible provides an underlying faith narrative, the change people need is a change of heart.24 We cannot bring this change about ourselves, any more than we can raise ourselves off the ground by pulling up on our own shoelaces. This is a work of God, first promised in the Old Testament by prophets such as Jeremiah24 and delivered in the New Testament by Jesus who said, “But I, when I am lifted up from the earth (on the Cross), will draw all men to myself.”25

The other most important sources of hope are the success stories we see as a result of
both governmental and NGO initiatives. If we are to make a difference we need to study these and see how we can strengthen such successes.

**The Matlab Project in Bangladesh**

In 1970 the TFR for women in Bangladesh was 6.9 children per woman. Due to a programme operating initially out of Matlab hospital, whereby trained Family Planning workers took information about family planning to village women through regular fortnightly visits, this figure was reduced to 3.3 by the mid-1990s and in 2015 was estimated to be 2.4. Bangladesh is a Muslim country, and the initiative was supported by the government and even Muslim clerics.

**PopOffsets in Britain**

PopOffsets is an organisation set up by the NGO, “Population Matters” (PM) in Britain. It uses donations to assist FP programmes in both developed and developing countries. PM has calculated that a donation of just £4 offsets one tonne of carbon if directed to family planning, by reducing the number of births and hence the number of consumers emitting CO₂, whereas the same reduction would require £8 pounds for tree planting, £15 for wind power, £31 for solar energy and £56 for hybrid vehicle technology. PopOffsets does not support abortion, so has widespread acceptance in the community.

**The work of PHE in the Lake Victoria Basin, East Africa:**

PHE, or Population, Health & Environment, works with whole communities for gender equality to promote the acceptance of family planning together with environmentally sound practices in countries such as Kenya and Uganda. Its approach of involving whole communities has given it wide acceptance and community cooperation. Misgivings about family planning have been replaced by confidence in its use, and sound environmental practices such as fuel-efficient stoves, no fishing areas in fish breeding grounds and the planting of thousands of native tree seedlings have been taken up with enthusiasm.

**The Population Media Center (PMC)**

This highly successful organisation, operating out of Vermont in the North East of the United States, was started by Bill Ryerson, an ecologist motivated by a deep concern for the impact of human population on nature. PMC works primarily in developing countries through radio serial dramas, which use local characters, local themes and issues to bring the message of family planning across to its listeners. Prior to starting work in a country, PMC obtains government permission to conduct a survey on the uptake of FP advice and services through
local clinics. After a serial drama has run for six months or so another survey is conducted. Always the uptake of FP advice and assistance has increased and, when asked the reason for their attendance at clinics, people cite the radio dramas as their reason. PMC is inundated with mail from grateful listeners.

So, there already are workable solutions out there to which we can readily donate, raise funds for their work and spread the word about their impact and with which we may become meaningfully involved.

CONCLUSION
It is right to be thankful for the favourable conditions that have come our way in modern times, such as better medical care and the improved living standards made available through fossil fuels; however, we can’t ‘have our cake and eat it too.’ Having chosen these pleasant options over previous ones, we have to counterbalance their effect – we have a responsibility to bring down family size in order to restore the planet’s ecology to good health – there is no other way to live within our means and do what is right by other species.

A helpful lesson, again from the Bible, is that we cannot play the ‘blame game’ we read about in Genesis chapter 3, where the man Adam and his wife Eve disobeyed a straightforward instruction and, when called to account, tried shifting the blame. Adam blamed his wife, and then he blamed God for giving him his wife. Eve blamed the serpent. Neither strategy succeeded in the story as they were turned out of the Garden anyway. As for us, while witnessing the decline of nature all around us, neither can we escape responsibility by blaming others, whether governments, the UN, the Catholic Church, big business, or anyone else (although all could do more to help). We cannot sit back having exonerated ourselves in our own sight because we will not get away with it either.

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ENDNOTES
1.Genesis 1:26
2.Genesis 1:28
3.Genesis 9:7
4.Matthew 28:19,20
5.John 3:3
6.Genesis 21:1,2
7.Genesis 1:22
8.Genesis 1:11
12. Philiippians 2:5 – 8
15. To calculate doubling time T2 in years for a variable increasing at a given rate r%, the formula is T2 = 70 / r. Current rate of increase of world population is around 1.13% so if we use r = 1.13 then T2 = 70 / 1.3 ANSWER: 62 years approx. World population clock currently 7.4 billion people: https://www.google.com.au/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8&q=world%20population%20growth
19. 2 Chronicles 36:20, 21
20. Psalm 24:1
22. Revelation 6:2 – 8
23. 18.7 births/1,000 population (2015 est.) or 15.3 thousand an hour http://www.indexmundi.com/world/birth_rate.html 7.89 deaths/1,000 population (2014 est.) or 6.5 thousand an hour approx. Net increase: currently 9.1 thousand per hour approx. http://www.indexmundi.com/world/death_rate.html
24. Jeremiah 31:33
25. John 12:32

http://www.populationmatters.org/?s=Offsets for tree planting
http://www.populationmatters.org/?s=Offsets+for+tree+planting

30. Success of gender equality programmes in Lake Victoria Basin.
Integrated community approach to population, health and environment in Lake Victoria Basin.

https://www.populationmedia.org/product/serial-dramas/

APPENDIX BIBLICAL TEXTS (NEW INTERNATIONAL VERSION)

1. Genesis 1:26 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 the livestock, over all the earth, and over all the creatures that move along the ground.”

2. Genesis 1:28 God blessed them and said to them, “Be fruitful and increase in number...”

3. Genesis 9:7 “… be fruitful and increase in number; multiply on the earth...”

4. Matthew 28:19, 20 “…Therefore go and make disciples of all nations …teaching them to obey everything I have commanded you…”

5. John 3:3 … Jesus declared, “I tell you the truth, no one can see the kingdom of God unless he is born again.”

6. Genesis 21:1, 2 Now the Lord was gracious to Sarah as he had said … Sarah became pregnant and bore a son to Abraham in his old age at the very time God had promised him.

7. Genesis 1:22 God blessed them and said, “Be fruitful and increase in number and fill the water in the seas, and let the birds increase on the earth.”

8. Genesis 1:11 Then God said, “Let the land produce vegetation: seed-bearing plants and trees on the land that bear fruit with seed in it, according to their various kinds.”

12. Philippians 2:5 – 8 Your attitude should be the same as that of Christ Jesus: Who, being in very nature God, did not consider equality with God something to be grasped, but made himself nothing, taking the very nature of a servant, ... And being found in appearance as a man he humbled himself and became obedient to death – even death on a cross.

19. 2 Chronicles 36:20, 21 He (Nebuchadnezzar) carried into exile to Babylon the remnant, who escaped from the sword, and they became servants to him and his sons until the kingdom of Persia came to power. The land enjoyed its Sabbath rests: all the time of its desolation it rested, until the seventy years were completed in fulfilment of the word of the Lord spoken to Jeremiah.

20. Psalm 24:1 The earth is the Lord’s, and everything in it.

21. Matthew 12:48 – 50 He replied to him, “Who is my mother and who are my brothers?” Pointing to his disciples he said, “Here are my mother and my brothers. For whoever does the will of my Father in heaven is my brother and sister and mother.”

22. Revelation 6:2 – 8 …there before me was a white horse. Its rider held a bow and he was given a crown and he rode out as a conqueror …Then another horse came out, a fiery red one. Its rider was given power to take peace from the earth … I looked … there before me was a black horse! Its rider was holding a pair of scales in his hand. … I looked and there … was a pale horse! Its rider was named Death, … They were given power to kill by sword, famine and plague …

24. Jeremiah 31:33 “This is the covenant I will make … after that time,” declares the Lord. “I will put my law in their minds and write it on their hearts. …”

25. John 12:32 “…But I, when I am lifted up from the earth, will draw all men to myself.