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THE STATE OF GLOBAL AND AFRICAN ECOLOGY

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Abstract. This article recounts the growth of concern for the environment in the latter half of the 20th Century, and its entry into Catholic magisterial theology. It expands on the ecological theory of planetary boundaries, and identifies how the theory surfaces in Pope Francis' 2015 encyclical *Laudato Si'*. Based upon solid contemporary science, the encyclical is well founded to outline an appropriate and compassionate moral theology of care for creation. The article cites multiple instances where African people are at the nexus of environmental and social crises, focusing on how contemporary ecological factors affect women in particular. Environmental crises should not induce a state of eco-anxiety, but, by following Pope Francis' theological ecology, we are empowered as hope-filled Christians to care for our common home.

Keywords: *Laudato Si'*; Africa; Planetary Boundaries; ecology; climate change

A Cause for Growing Concern

When Pope Francis published the encyclical *Laudato Si'*: *On Care for Our Common Home*, on Pentecost Day, 2015, many Christians responded that he was taking the church in

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new directions and focusing attention on a matter that is not of high priority. In fact, as he demonstrates convincingly in the first chapter of the encyclical, care for the environment has a venerable tradition in the Christian practice. The encyclical makes explicit something that has been present for many generations, and solidifies the status of environmental care as one of the pillars of Catholic Social Teaching. The urgency of the matter has become more evident in recent years.

In 1967, Lynn White published his seminal article identifying Christian anthropocentrism as the root cause of the current "ecologic crisis."[1] His argument was that over the centuries, Christians had taken seriously the injunction of Genesis 1:28f[2] to subdue the earth, and this has led to the Western dogma of human transcendence and mastery over all that is not human. White maintains that: "[w]e will continue to have a worsening ecologic crisis until we reject the Christian axiom that nature has no reason for existence except to serve man."[3] Whether White is entirely correct or not is not the focus of this chapter.[4] What is important is that it demonstrates, already fifty-five years ago, there was a growing realization that things were going very badly for the natural world.

Thus, the perception of a pending global catastrophe is not new. Since the 1960's there has been concern about the state of global ecology. I remember reading three fascinating books in the

[1] Lynn White, "The Historical Roots of Our Ecologic Crisis," *Science* 155, no. 3767 (10 March 1967).

[2] "Be fruitful, multiply, fill the earth, and subdue it; be masters of the fish of the sea, the birds of heaven and all the living creatures that move on the earth."

[3] White, "The Historical Roots of Our Ecologic Crisis," 1207.

[4] In partial agreement with White, Pope Francis identifies human activity—although not specifically Christian activity—as the cause of the ecological crisis. Chapter 3 of his 2015 encyclical *Laudato Si'*: On Care for Our Common Home is entitled "The Human Roots of the Ecological Crisis." Here Francis names the globalized technocratic paradigm as the chief culprit, and locates the paradigm in a "modern anthropocentrism" which ignores the dignity or autonomy of creation.

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LIFE Sciences library[5]—and being aware, as a child, of the fragility of our planet. In this article, we examine some of the parameters of the state of the global ecology, for insight into the "greatest existential threat of our time."[6] This will illustrate why Francis and his immediate predecessors have been so vocal on matters concerning the environment. A suffering planet inevitably means that the people living on that planet are also suffering. And it is the poorest of these people who suffer most.

In 1972, the "Club of Rome" published the insightful *Limits to Growth*. The book explores the obvious fact that the planet has limited dimensions and resources. Earth cannot continue to support indefinitely growing populations or economies. In particular, five factors limit growth: "population increase, agricultural production, nonrenewable resource depletion, industrial output, and pollution generation." Using sophisticated (at the time) computer modeling, the authors demonstrate that the human population can reach and maintain a sustainable level, with an equilibrium between consumption and the restoration of the earth's resources.[7] In certain quarters, the book was not well received: capitalism is prefaced upon unlimited growth and expansion of markets and production. Certain Catholics considered the implication that the human population should be limited to be against Church teaching.[8]

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[5] Cf. Arthur Beiser, *The Earth* (New York: Time–Life Books, 1969); Leonard Engel, *The Sea* (New York: Time–Life Books, 1968); and A. Starker Leopold, *The Desert* (New York: Time-Life Books).

[6] Cf. The Elders, "Five Reasons Climate Change Is the Greatest Existential Threat of Our Time," 5 October 2018, accessed 3 September 2024, https://www.theelders.org/news/five-reasons-climate-change-greatest-existential-threat-our-time.

[7] See Donella H. Meadows et al., *The Limits to Growth* (New York: Universe Books, 1972), http://www.donellameadows.org/the-limits-to-growth-now-available-to-read-online/.

[8] However, the Church teaches responsible parenthood and natural family planning.

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In Stockholm in the same year 1972, the United Nations held the first-ever Conference on the Human Environment. The Stockholm Declaration "placed environmental issues at the forefront of international concerns and marked the start of the dialogue between industrialized and developing countries on the link between economic growth, the pollution of the air, water and oceans and the well-being of people around the world."[9] While more industrialized nations were calling for stringent measures to protect the environment, a group of 77 developing nations and China did not want their prospects for development to be jeopardized by more compelling environmental concerns. Since the Stockholm Conference, there has been more or less the same dynamic. Less-industrialized countries want to "catch up," while the more-industrialized countries are pointing out the ecological hazards of their own developmental paths and the immeasurable destruction that their trajectories have caused to the natural environment.

Since Stockholm, the United Nations has held conferences which have focused global attention on, and resulted in protocols or resolutions regarding the following environmental issues: biological diversity, ozone depletion, nuclear energy, persistent organic pollutants, the seas, climate change, sustainable development, hazardous waste, international trade in endangered species, watercourses, biosafety, pesticides, etc. Likewise, at the level of the African Union, there are conventions or protocols on plant safety, conservation of nature and natural resources, development, hazardous waste, nuclear weapons, human and people's rights, and separate protocols on the rights of women, children, older people, and people with disabilities.[10] Similar sets of regulations exist in every continental grouping, indicating the great and growing concern for ecologies and the flourishing of people within their environment.

[9] Cf. United Nations, "United Nations Conference on the Human Environment, 5–16 June 1972, Stockholm," accessed 22 February 2024, https://www.un.org/en/conferences/environment/stockholm1972.

[10] Cf. African Union, "OAU/AU Treaties, Conventions, Protocols & Charters," AU, 2023, accessed 27 February 2024, https://au.int/treaties.

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In 1987, the UN World Commission on Environment and Development published its famous report *Our Common Future,* which recognized multiple threats to the environment and proposed new trajectories for sustainable development, which "meets the needs of the present without compromising the ability of future generations to meet their own needs."[11] *Our Common Future* recognizes the paradox that "Environmental degradation, first seen as mainly a problem of the rich nations and a side effect of industrial wealth, has become a survival issue for developing nations."[12] This article will examine some of the most pressing dimensions of this "survival issue" of environmental degradation as they concern both the wealthy and the developing nations, and in particular, how they apply in Africa.

Planetary Boundaries

Research into the state of global ecology is an ongoing enterprise. There is no definitive statement on the deteriorating conditions of the planet. For example, between 2013 and 2019, the United Nations Environmental Programme (UNEP) published regular iterations of its *Frontiers* reports, which highlighted emerging issues of environmental concern. Over the years, these have dealt with synthetic biology, ecological connectivity, permafrost peatlands, nitrogen fixing, maladaptation to climate change (in the 2018-2019 edition)[13] the financial sector, zoonoses, microplastics, unavoidable impacts of climate change on ecosystems, accumulation of toxins in crops, the

[11] *United Nations World Commission on Environment and Development, Our Common Future* (Oslo: UN, 1987), 37. http://www.un-documents.net/our-common-future.pdf. This document is sometimes known as the Brundtland Report, after its chairperson, Gro Harlem Brundtland.

[12] *United Nations World Commission on Environment and Development, Our Common Future*, 37.

[13] *United Nations Environment Programme*, Frontiers 2018/19: *Emerging Issues of Environmental Concern* (Nairobi: UNEP, 2019).

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illegal trade in live animals (in the 2016 edition),[14] etc. These emerging issues have global significance. Indeed, in 2019, one zoonosis (the Severe Acute Respiratory Syndrome Coronavirus 2) transferred from an unidentified species to human hosts which had no resistance to this virus, causing the Covid-19 pandemic. The pandemic caused an estimated 3 million 'excess deaths.'[15] Each one of the UNEP-identified issues warrants full understanding and attention if we are to protect our common home for both present and future generations.

In addition to the regular bulletins from the UNEP, the most comprehensive overarching theoretical approach to the maladies of our planet was first announced in 2009, initially quantified in 2015, and further elaborated in 2023. "Planetary Boundary Theory" first came to world attention with the simultaneous publication in the journals *Ecology and Society* and *Nature* in September 2009, by a team of prominent international geoscientists under the leadership of Johan Rockström of the Stockholm Resilience Centre.[16] The theory asserts that during the geological epoch known as the Holocene,[17] specific conditions of temperature, humidity, oxygen concentration, and other factors have prevailed, which have enabled human life to flourish. Rockström et al. identify nine mutually-interactive physical planetary preconditions necessary for humans to survive (as biological organisms).

[14] United Nations Environment Programme, Frontiers 2016 Report: Emerging Issues of Environmental Concern (Nairobi: UNEP Division of Early Warning and Assessment, 2016).

[15] Cf. World Health Organization, "The True Death Toll of COVID-19: Estimating Global Excess Mortality," *WHO*, accessed 25 February 2024, https://www.who.int/data/stories/the-true-death-toll-of-covid-19-estimating-global-excess-mortality.

[16] Cf. Johan Rockström et al., "Planetary Boundaries: Exploring the Safe Operating Space for Humanity," *Ecology and Society* 14, no. 2 (2009), accessed 22 February 2024, http://www.ecologyandsociety.org/vol14/iss2/art32/. See also Johan Rockström et al., "A Safe Operating Space for Humanity," *Nature* 461 (24 September 2009), accessed 22 February 2024, http://www.nature.com/nature/journal/v461/n7263/full/461472a.html.

[17] This refers to the last 11,700 years since the last major 'ice age.'

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There is general agreement among scientists that the world has now entered the third epoch of the Quaternary Period—the Anthropocene—in which it is possible to see the effects of human beings on the geology of our planet. In particular, since the 1950s' "great expansion", anthropogenic changes to the earth's surface area, atmosphere, nutrient cycling, oceans, and climate, etc., have intensified.[18] Planetary boundary theory explores how the Anthropocene is, in fact, less conducive to human existence than its predecessor epoch, the Holocene.

The original 2009 version of the theory posited the existence of planetary boundaries and their interaction, making rough estimates about the state of each. By 2009, three of the boundaries had already been overstepped. By 2015, many scientists around the world had researched the nine parameters and proposed numerical levels for the danger levels and thresholds beyond which the "Earth System" becomes inhospitable to human life. In the 2023 version of the research, scientists demonstrated that six of the nine boundaries had already been transgressed due to unprecedented human disruption of the Earth's systems.[19] They acknowledge that there are still significant numerical uncertainties, and that the theory is evolving as the interactions between the various parameters are better understood:

> The distinction between zones of 'increasing' and 'high' risk cannot be sharply defined. There is accumulating evidence that the current level of boundary transgression has already taken the Earth system beyond a 'safe' zone. However, we still lack a comprehensive, integrated theory, backed by observations and modeling studies, that can identify when a transition from a rising level of risk to one with very high and dangerous risks of losing a Holocene-like Earth system state may occur.[20]

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[18] John P. Rafferty, "Anthropocene Epoch," *Britannica.com*, Feb 2024, accessed 25 February 2024, https://www.britannica.com/science/Anthropocene-Epoch.

[19] Katherine Richardson et al., "Earth Beyond Six of Nine Planetary Boundaries," *Science Advances* 9, no. 37 (13 September 2023), accessed 22 February 2024, https://doi.org/10.1126/sciadv.adh2458.

[20] Richardson et al., "Earth Beyond Six of Nine Planetary Boundaries," 3 of 16.

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The nine planetary boundaries (in the 2023 version of the research) are:

- Stratospheric ozone depletion
- Atmospheric aerosol loading
- Ocean acidification
- Biogeochemical flows – which include the nitrogen and phosphorus cycles
- Freshwater change – divided for the first time between "green" and "blue" water
- Land system changes, which include deforestation, wetland depletion, and desertification
- Biosphere integrity – which references both functional and genetic biodiversity
- Climate change – incorporating CO_2 concentration and radiative forcing
- Novel entities – such as microplastics, organic pollutants, radioactive waste, etc.

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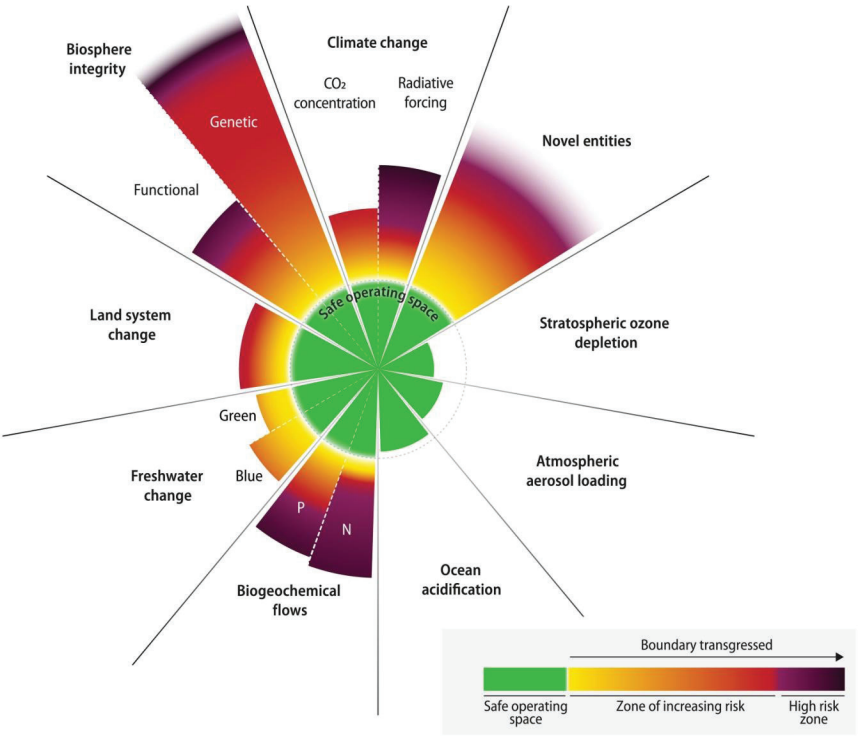


Fig. 1: Planetary boundaries in 2023 from Richardson, Steffen et al.

To the layperson, part of the appeal of the planetary boundary theory is that it can be represented in one simple infographic, which requires minimal knowledge of mathematics or science (Fig. 1). The infographic presents the current situation of the nine planetary boundaries and how near or how far the Earth is to overstepping the thresholds for human survival. The infographic indicates for each parameter whether the world is in a safe operating space, a zone of increasing risk, or a zone of high risk. From the infographic for the 2023 research, it can clearly be seen that of the list of nine parameters, the world is still in a safe operating space for the first three. However, we are in zones of increasing risk, or in high-risk zones, for the other six of the nine planetary boundaries. Of greatest concern are the indicators for climate change, biosphere integrity, and biogeochemical flows. One thing that is immediately clear from the graphic is that climate change is not the only threat to the well-being of planetary life. The collapse

of biodiversity (genetic biosphere integrity) and the disturbance of the phosphorus and nitrogen cycles are two other causes for great concern.

To add to the complexity, it is not yet possible to predict what effect the transgression of one boundary will have on the situation regarding the other boundaries:

> Quantifying interactions between boundaries remains a major challenge. However, some progress has been made since the last framework update. Recent studies […] have shown that additional or more extensive transgression of one planetary boundary can change risk gradients for other boundaries. For example, there is increasing evidence to suggest that transgressing either the climate change or biosphere integrity planetary boundary can potentially lead to more steeply increasing risk in the other.[21]

We realise from the planetary boundary theory that the threats facing humanity are global. No ecological phenomenon follows national or political borders. For example, the whole world is experiencing unprecedented weather events due to climate disturbance, which may ultimately have been caused by patterns of production and consumption in industrialized countries. However, the threats may cause stronger or weaker local manifestations of the transgression of boundaries. Although global climate change is so complicated with so many factors coming into play, the retention of heat (known as positive radiative forcing) of the planet is *felt* more acutely by populations around the tropics, on which solar radiation falls more directly. Thus, tropical areas may be subject to longer and more intense periods of drought. On the other hand, global climate change is causing catastrophic melting of the permafrost, ice, and glaciers in the Arctic and Antarctic Circles. This ice turning to water is flowing into the oceans, ultimately causing the sea levels to rise. This effect is obviously observed more in coastal areas, and threatens low-lying towns and settlements. Warmer ocean water means more evaporation, with the formation of denser clouds where these clouds precipitate, the hail, rain or snowfall might be heavier than many areas have been accustomed to during the previous millennia of a more stable climate.

[21] Richardson et al., "Earth Beyond Six of Nine Planetary Boundaries," 3 of 16.

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Climate Change

In addition to the localized experiences of climate change, the transgressions of several of the boundaries have feedback loops, which intensify the actual transgression. For example, as the Arctic permafrost melts, methane (CH_4),[22] which has been sequestered in the frozen permafrost for thousands of years, is released into the atmosphere. The methane causes even more intense global climate change.

The major cause of so-called 'greenhouse gases' (GHGs) is the combustion of fossil fuels like coal, oil, and gas since the European Industrial Revolution of the 1750's. The burning has released carbon dioxide (CO_2) into the atmosphere on a scale previously unseen in human history. Up till the early 20th Century, the concentration of atmospheric CO_2 was stable at around 280 parts per million (ppm). Since 1900, the concentration has risen to approximately 424 ppm as measured in one instance in Hawaii in May 2023.[23] Like a good warm blanket, CO_2 and other GHGs that have been released over the two hundred and sixty years since the start of the industrial revolution, have been accumulating in the atmosphere, trapping the radiative heat of the earth. This has caused the planet's temperature to gradually increase by more than 1.5°C above the levels that prevailed before the industrial age.

The fossil fuels, which have sequestered carbon from decomposing vegetation and animal matter for millions of years, have been used for locomotion, industry, and heating. The burning of these fossilized chemicals simply re-releases all of that carbon into the Earth's

[22] Methane (CH_4), produced by the rotting of organic matter, is a much stronger greenhouse gas than carbon dioxide (CO_2), which is produced mainly by the combustion of organic matter.

[23] This refers to the estimated CO_2 concentration in May 2023. It is no coincidence that 2024 has been the hottest year in recorded history. Cf. World Meteorological Organization. "WMO Confirms 2024 as Warmest Year on Record at about 1.55°C Above Pre-Industrial Level," 10 January 2025, accessed 3 February 2025, https://wmo.int/news/media-centre/wmo-confirms-2024-warmest-year-record-about-155degc-above-pre-industrial-level.

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atmosphere as CO_2. Perhaps the worst things that the Industrial Revolution has given the world are the internal combustion engines, which have proliferated worldwide in all kinds of motor transport and consistently spew out climate-changing CO_2. To try to minimize climate change, the world needs to transit away from heavily polluting fuels to "cleaner" renewable sources of energy from the wind, the sun, waves, hydroelectricity, etc. In a race against time, the technology to achieve this is being improved day by day. But there are so many sunken costs already in the fossil-fuel value chain that some petrochemical companies and countries are reluctant to transition from their oil-based economies. Against the tide of history and to the detriment of the global climate, some countries continue to permit multinational companies to prospect for and exploit new oil fields.[24]

But the combustion of fossil fuels is not the only source of GHGs. It is estimated that approximately "25-30% of total GHG emissions are attributable to the global food system. These are from agriculture and land use, storage, transport, packaging, processing, retail, and consumption."[25] The amount of CH_4 produced in the growing of rice in paddies is becoming such a serious concern that new ways are being explored for the cultivation of the food-crop that feeds billions of

[24] In one of the ironies of history, countries in Eastern Africa are demanding climate-change compensation, while at the same time developing new oilfields and the infamous heated East African Crude Oil Pipeline (EACOP).

[25] Intergovernmental Panel on Climate Change, *Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems* (Geneva: IPCC, 2019), chap. 5, "Food Security," https://www.ipcc.ch/srccl/.

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people.[26] On the meat-side of our diet, ruminants[27] burp out so much CH_4 , that industrial-scale farming, with over 1 billion cattle, makes a significant contribution to global climate change.[28]

In addition, modern industrial-scale agriculture depends heavily on the use of nitrate and phosphate fertilizer inputs.

Indeed, at the United Nations General Assembly on 26 October 2021, the Secretary General António Guterres said concerning climate change:

> Rarely have we faced a crisis like this one. A truly existential crisis that if not addressed threatens not only us but succeeding generations. There is one path forward: A 1.5 degree future is the only livable future for humanity. And I urge leaders to get on with the job before it is too late.[29]

[26] It is estimated that the anaerobic decay of organic material in rice paddies contributes about "40 million tonnes of methane, or 8% of global anthropogenic emissions, per year." Cf. Polina Checerina, "Using Climate-Smart Rice to Reduce Methane Emissions from Agriculture," Climate & Clean Air Coalition to Reduce Short-Lived Climate Pollutants, 1 December 2022, accessed 27 February 2024, https://www.ccacoalition.org/news/using-climate-smart-rice-reduce-methane-emissions-agriculture.

[27] Ruminants typically have four stomachs, the largest of which is the rumen, which aids in the digestion of vegetable matter. Cattle, sheep, goats, camels, giraffes, etc., belong to this class of animals. They produce methane by enteric fermentation in their rumination, as well as in their large intestines. So this GHG is emitted from both ends of their digestive tract. Cf. Food and Agricultural Organization of the United Nations, *Greenhouse Gas Emissions from Ruminant Supply Chains: A Global Life Cycle Assessment* (Rome: FAO, 2013). https://www.fao.org/3/i3461e/i3461e00.htm.

[28] Other major environmental problems attributable to the industrialization of agriculture and the so-called "Green Revolution" of the last century include excessive use of pesticides and fertilizers (mostly nitrates and phosphates which degrade soil fertility), monoculture of a few commercial crop cultivars (reducing overall crop resistance), and exclusion of those who do not have the finances to purchase the seeds each year.

[29] See António Guterres (@antonioguterres), X (formerly Twitter), https://twitter.com/antonioguterres/status/1453075204696166401?lang=en

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Pollution and "Novel Entities"

In 2017, *The Lancet* medical journal dedicated an entire issue to the report of the Lancet Commission on Pollution and Health. The journal highlighted the dangers that pollution poses to human health.[30] In particular, in 2015, the authors estimate that 9 million premature deaths were caused by pollution, and 92 percent of all these pollution-related deaths occur in low- and middle-income countries, and in all countries, pollution-related diseases are among the minorities and the marginalized. Children are at the highest risk of pollution-related diseases, particularly in utero and in early infancy, when even a small exposure can lead to death, disability, or life-long disease. In many low- and middle-income countries, pollution is often overlooked as a health issue.[31] There are obviously economic costs when a country's burden of disease increases.

Pollution can be broadly understood to be things that are not in the place where they are supposed to be. Pollution can be in the air we breathe, the water we drink, and on the land. Fumes from vehicles, power generation, mining, manufacturing industries, domestic cooking, decaying matter, sewage, and animal dung all affect human lungs. Airborne particles as small as 2.5 micrometers[32] are frequently emitted by the exhausts of vehicles, household cooking, bush or forest fires, etc., and can enter human lungs, interfering with the air-blood interface, and causing serious respiratory diseases. Air pollution can travel thousands of kilometers from its source, even crossing oceans. An often underestimated form of pollution is noise pollution, which can significantly impact cognitive and cardiovascular health, disrupt sleep, and impair hearing, as well as work and school performance. The World Health Organization reports that: "Impairment of early

[30] See Philip J. Landrigan et al., "The Lancet Commission on Pollution and Health," The Lancet Commissions 391, no. 10119 (19 October 2017), https://doi.org/10.1016/S0140-6736(17), 32345-0.

[31] Landrigan et al., "The Lancet Commission on Pollution and Health," 462.

[32] Or 2.5 x 10^{-6} m. Soot, or "black carbon," from incomplete burning of organic matter, is a widespread small particle pollutant.

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childhood development and education caused by noise may have lifelong effects on academic achievement and health."[33]

The novel entities in the planetary boundary theory refer to chemicals, radioactive waste, nanoparticles, plastics, pharmaceuticals, and other persistent organic pollutants. These are novel in a geological sense, being created by human beings, and they might have impacts on the integrity of the Earth system.

For example, when plastic, which is specifically designed to be cheap, long-lived, flexible, and lightweight, is discarded and persists in the environment rather than being recycled or reused, this constitutes pollution by a novel entity. Plastic pollution is ubiquitous. It is in rivers, estuaries, the depths of the oceans, the high Arctic, the atmosphere, and most landscapes. When people burn plastic to stop it from flapping around in the environment, this produces highly toxic fumes.

Similarly, the extractive and manufacturing industries are responsible for various types of chemical pollution, contaminating freshwater, landscapes, and releasing fumes into the air. It is almost impossible to decontaminate chemically polluted air, water, and landscapes, and these are unusable or harmful to living organisms. Chemicals frequently enter the food chain, and through a process known as bioaccumulation, may end up poisoning the species higher up the trophic pyramid. When motor vehicles or ships reach the end of their useful life, they are often abandoned or taken to places where relatively cheap laborers can break them down into smaller usable parts.[34]

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[33] See World Health Organization, "Noise," *WHO Europe*, 2010, accessed 1 March 2024, https://www.who.int/europe/news-room/fact-sheets/item/noise.

[34] For example, the Gujarati ship breaking industry based in Alang, and the formerly pristine Ghanaian coastline are places where large ships are beached for demolition. The scrapping process invariably allows toxic paint, oil, lead, mercury, etc. to come into the sea water. This has seriously harmful effects on the people doing the ship breaking, as well as on the fishing, on which thousands of people depend for a livelihood. Mangroves are polluted and can no longer function as the breeding grounds for fish. Plankton, fish and crustaceans ingest

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When we discard household products or create electronic waste without delivering it to facilities that can recycle or repurpose the materials, they end up leaching toxic chemicals into the environment, frequently near human habitation. Often, when we throw something "away," we have no idea where that product ends up. It is out of sight and out of mind. In some human settlements, it ends up in a landfill site, where it can stay for hundreds of years in a potentially toxic mix with other discarded solid waste.

Better organized societies invest a significant amount of expertise and resources in separating out solid waste, in order to recycle, reuse, or repurpose the detritus of contemporary commercialized life. Plastics, glass, metals, papers, chemicals, pharmaceuticals, etc., can all be removed from the waste flow and disposed of in ways that are less damaging to the environment than simply discarding them on a dump site. A "circular economy" recognizes that everything has a "pre-life" and an "after-life," which are often much more complicated than the brief useful life of a product. Circularity attempts to connect the pre- and post-lives, ensuring that products are not used only once in a linear manner and then discarded. Rather than being recycled, most plastic packaging, for example, ends up in landfill sites and can remain there for centuries. Packaging can be blown away by the wind and end up scattered around landscapes. It can be consumed by animals, causing choking or blocking their digestive tracts, or break down under the effects of sunlight and water into microplastics or mini-microplastics, which are less than 5mm or less than 1mm in size, respectively. These small plastics can last in the environment for decades and not break down any further. These end up in the stomachs of smaller animals and can starve them because they have no nutritional value. They can also end up in the food and drinks that humans consume, either through vegetables or in the tissues of fish, birds, or mammals that we consume.

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the pollution and die, become sterile, or accumulate the poisons, which then get passed up the food chain—often ending up in human beings. See Marian Ansah, "Ghana Ignores Shipbreaking Rules," *Mail and Guardian* (Johannesburg), 23–29 February 2024; and See also Kit Chapman, "The Toxic Tide of Ship Breaking," *Chemistry World*, 21 February, 2022, accessed 3 February 2025, https://www.chemistryworld.com/features/the-toxic-tide-of-ship-breaking/4015158.article.

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In addition to the upset of biogeochemical flows, modern industrial-scale agriculture depends heavily on the use of nitrate and phosphate fertilizer inputs. This has led to the imbalance of the natural nitrogen and phosphorus cycles on a planet-wide scale. These fertilizers degrade the soil, and irrigation water easily runs off into watercourses, making the water hyper-fertile. Algae and other plants grow easily in polluted rivers and water bodies, depriving them of light and oxygen, killing off fish and other aquatic life, and ultimately altering the species domination in the water. This process is called "eutrophication."

Consequences for Africa

We may think that many of these environmental challenges do not relate to Africa, since ours is a less industrialized continent. But ecological threats are no respecters of political or continental boundaries. They are carried on the winds and the ocean currents, by migrating animals, or by international trade and travel. Our economies are interlinked with global economies, and industrial products are sold every day. Since Africa is rich in minerals required for the green energy transition, many mining companies are establishing operations in the continent's shores. Many of these multinational corporations have a record of benefiting from the weak observation of legislative frameworks designed to protect African natural conditions and blessings. There is no evidence to suggest that future governments will be more diligent in enforcing environmental laws than existing governments. Transgressions of planetary boundaries have global implications, and their effects will persist for generations.

In addition, we have our own homegrown trajectories of overexploiting and damaging our environment. These cannot be blamed on colonialism or "The West." It is the lack of foresight of African people—often our elected leaders—that leads directly to the transgression of boundaries. "National resources and public funds are often diverted into foreign bank accounts to the profit of domestic or foreign private interests. [Pope] John Paul calls this 'plain theft,' no

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matter what camouflage is used."[35] As an example, in the European colonial era, timber and ebony were "harvested" and exported from Africa in vast quantities. But in the postcolonial era, "Agriculture is the largest direct cause of forest loss, accounting for approximately 75 percent of deforestation in Africa. This includes both subsistence farming and industrial agriculture—which includes cocoa and oil palm production—and cattle ranching"[36] This applies to both the dry forests and the Congo basin rainforests.

It is almost impossible to predict what Africa will experience in the future. Because the continent is so large and encompasses a wide range of climatic zones, the disruptions caused by climate change vary across the continent. As the climate changes, so do the land systems, expanding deserts in some regions but perhaps creating ideal conditions for forests to grow in other places. With rising temperatures in some regions, dry-season wildfires may burn unchecked over vast areas of savannah or forest for long periods. These will release more climate-changing CO_2 into the atmosphere and particulate matter (smoke) into the air, which will affect the air quality for all creatures that need to breathe. With more arid and hyper-arid land than any other continent,[37] entire African communities are already being forced to migrate from their homes which they have inhabited for many decades, as prolonged drought and human activity make their area uninhabitable. Other

[35] Cf. Peter Knox, "Theology, Ecology and Africa: No Longer Strange Bedfellows," in *Reconciliation, Justice and Peace: The Second African Synod*, ed. A. E. Orobator (Maryknoll: Orbis, 2011). This includes reference to John Paul II, *Ecclesia in Africa: Post-Synodal Apostolic Exhortation* (Vatican City: Libreria Editrice Vaticana, 1995), 113.

[36] Cf. Paolo Omar Cerutti, Thiago Kanashiro Uehara, and Jon Wallace, "Deforestation in Africa," *Royal Institute of International Affairs* (Chatham House), 2023, accessed 12 March 2024, https://www.chathamhouse.org/2023/05/deforestation-africa.

[37] Intergovernmental Panel on Climate Change, *Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*, chap. 3, "Desertification."

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populations will be compelled to move as excessive rainfall floods vast areas, and there is no way to plant crops or tend livestock.

If the aforementioned land-system changes are caused by global climate change, there are also direct changes to land systems resulting from human activity, which in turn have immediate consequences for biodiversity. As human populations increase, the need for habitation expands, and the footprints of cities and towns grow. It is easier to drain wetlands than to build on mountains or in deserts. So wherever populations are growing around the world, wetlands are being destroyed, and along with them the habitats of many aquatic species. The quality of surface water (one of the nine planetary boundaries) deteriorates, and the supply becomes more erratic. This is because the wetlands function as giant sponges and filters, retaining and purifying rainwater or water from streams and rivers. If human habitation expands into forests or savannahs, or if people rely on charcoal as a cooking fuel, the vegetation is cut down and the species of plants and animals originally living there are no longer able to retain a foothold. In addition, as habitats are fragmented, populations of animals become unsustainable, and the migratory species cannot follow their traditional routes.[38] In these cases, the expansion of human populations has direct consequences for the breakdown of the biosphere's functional integrity. As some plant and animal species die out completely,[39] the

[38] Cf. Convention on the Conservation of Migratory Species of Wild Animals, "Major New Global Initiative to Protect and Connect Natural Areas Launched at UN Wildlife Meeting," *CMS*, 14 February 2024, accessed 27 February 2024, https://www.cms.int/en/news/major-new-global-initiative-protect-and-connect-natural-areas-launched-un-wildlife-meeting. The meeting launched a Global Partnership on Ecological Connectivity to ensure migratory species may continue using their habitual migratory routes through contiguous spaces without entering into conflict with humans who have moved into the landscape.

[39] Some scientists maintain that Earth is currently in its sixth mass extinction in half a billion years. About one-tenth of living species are expected to die out. This "Sixth Great Extinction" is largely due to human activities and will leave the surviving species much more vulnerable to calamitous widespread diseases, etc. Cf. Elizabeth Kolbert, *The Sixth Extinction: An Unnatural History* (New York: Macmillan, 2014).

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genetic variety of life on the planet is reducing. This leaves insufficient plant and animal genetic resilience to survive a catastrophic event like a viral or bacterial infection, depletion of the soil, or excess temperature.

With a taste for "bush meat," some African societies are contributing directly to the extinction of animal species. When human populations were smaller and more spread out, it was possible to kill enough wild antelope, primates, birds, or reptiles from the natural environment and still ensure that there would be sustainable populations. Nowadays, in towns and cities, people still want to consume bush meat in traditional ways. But there are so many more people that the demand outstrips the limited supply. This is unsustainable and results in the killing off of the favorite species.

In traditional African societies, some streams, hills, forests, or animal species, or foods were considered sacred.[40] It was therefore taboo for people who were not permitted to do so to visit these areas or to consume these foods. Only those who had ritual permission were allowed to enter the taboo spaces—to communicate with the ancestors or to perform other interventions on behalf of their societies. The imposition of taboos often served to protect particular spaces or species of biological importance or ecological sensitivity. With the movement of people around Africa, traditional society has undergone a breakdown, and former taboos are often no longer respected. The attitude is: "your religion is not my religion." This means that the spaces and species no longer enjoy the protection afforded to them by ancient traditions.[41] Once pristine rivers, forests, or mountains have

[40] For example, in *Sesotho, malome o ja hloho*—the (elder) uncle is the only person who would eat the head of an animal. This meant that the limited resource (head) was reserved to a small number of people, and so not everyone developed a taste for that part of the animal. Similarly, the liver of a slaughtered animal was reserved for elderly women.

[41] For example, the Modimolle Mountain in Limpopo Province, South Africa, was once considered sacred but has since lost that protection. Cf. SABC News. "Local People in Limpopo Want to Turn Modimolle Mountain into a Tourism Hotspot," 2021, accessed 12 March 2024, https://www.youtube.com/watch?v=3-mU3sBpuiE.

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lost that quality. When and if local or national governments intervene to conserve an area, it is often not understood, and people might claim that their forebears had access to these places, arguing that the current generation should not be prevented from accessing the spaces.

Although African countries have set aside large areas for national parks or protected areas, the boundaries of these areas are often porous. This means that poachers can enter and remove protected minerals, animals, or parts of plants.[42] It also means that animals can move beyond the boundaries of the parks, where they either enter into conflict with local residents, frequently over competition for food, or they are killed outright because they pose a danger or have commercial value. There is increasing recognition of the fact that migrant mammal species are not great respecters of human-drawn boundaries, such as those around countries or protected areas. So sometimes neighboring countries allow contiguous areas to remain wild in what are known as 'transfrontier parks.' The most famous example of this is the Serengeti-Mara-Ngorongoro biome, which allows the free passage of the famous wildebeest and zebra migration between Kenya and Tanzania. There are also several transfrontier parks in southern Africa that permit the migration of herds of elephants.

Not Gender Blind

It is important to note that ecological factors are not gender blind. Most often, women who also care for elderly or housebound relatives are on the front lines of environmental disturbances. In various African cultures, women work in the fields, cultivating crops and providing food for their households or for sale. The IPCC notes that: "Women will be

[42] This also happens in very public conservation areas like the Table Mountain National Park in Cape Town, South Africa. Cf. Don Pinnock, "A Conversation with the Man Who Paints Trees to Prevent Bark Stripping," *Daily Maverick* (Johannesburg) 25 February 2024, accessed 27 February 2024, https://www.dailymaverick.co.za/article/2024-02-25-meet-the-man-who-paints-trees-to-combat-bark-stripping/.

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impacted more than men by environmental degradation, particularly in those areas with higher dependence on agricultural livelihoods."[43]

The IPCC *Special Report on Desertification and Land* continues:

> Socially structured gender-specific roles and responsibilities, daily activities, access and control over resources, decision-making and opportunities lead men and women to interact differently with natural resources and landscapes. For example, water scarcity affected women more than men in rural Ghana as they had to spend more time fetching water, which has implications on time allocations for other activities… Women are usually excluded from local decision-making on actions regarding desertification and climate change… Food security for them is associated with land productivity and women's contribution to address desertification is crucial.[44]

When climate change makes cultivation or livestock raising more challenging, it is often women who end up doing additional work or having to stretch their budgets to make food supplies last. In addition, women bear the burden of childbearing and play a disproportionate role in the raising of children. Rising ambient temperatures place living organisms under great stress. When that is a mother bearing a child, the stress is magnified.

Pope Francis' Theological Ecology

In 2015, Pope Francis published *Laudato Si'*, a groundbreaking encyclical on care for our common home. The title of the encyclical echoes the canticle of St Francis of Assisi, praising God for all the wonders of creation. The encyclical is a masterly synthesis of environmental, sociological, and theological teaching. The major insight of the encyclical is that "we are faced not with two separate crises, one environmental and one social, but rather one complex crisis which is

[43] IPCC, *Special Report on Climate Change*, 251.

[44] IPCC, *Special Report on Climate Change*, 274.

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both social and environmental."[45] He states that: "a true ecological approach *always* becomes a social approach; it must integrate questions of justice in debates on the environment, so as to hear *both the cry of the earth and the cry of the poor*."[46]

The pope's point of departure is his Christian compassion for human suffering. He realizes that so much misery has its origin in human abuse of the planet, which God has given to accommodate and sustain all of living creation. To diminish this ecology-related suffering, all of humankind should undergo an "ecological conversion."[47]

In *Laudato Si'*, the pope makes a profound analysis of what is happening to our common home, and states unambiguously that this tragedy, caused by human greed, arrogance, and lack of foresight, contradicts the Gospel of Creation. Following the insight of Francis of Assisi, Pope Francis insists that human beings are part of nature, not set apart or another order of existence. There is no human-nature dualism: "Nature cannot be regarded as something separate from ourselves or as a mere setting in which we live."[48] Everything involved in daily life—the economy, food systems, the urban environment, wildlife, and more—is part of an integral ecology. We need to consider all things as part of a functioning whole, and not in isolation. As a necessary alternative to the contemporary destructive, extractive, consumptive "throwaway" economy of capitalism, Francis proposes a worldview that sees humans as part of their interconnected environment, taking special care of future generations and the common good of all creatures. To do this, we need to have dialogue between all people on the Earth—at

[45] Francis, *Encyclical Letter on Care for Our Common Home: Laudato Si'* (Vatican: Libreria Editrice Vaticana, 2015), 139. http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html.

[46] Francis, *Laudato Si'*, 49.

[47] "Ecological conversion," the title of section three of the final chapter of the encyclical, shows the interpenetration of the natural and spiritual dimensions of our existence.

[48] Francis, *Laudato Si'*, 139.

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the international and local level, privileging the experience of the poor and indigenous people who live closest to the land. This dialogue will lead people to understand that their true value and fulfillment lie not in what they purchase and possess, but in how they are connected with their universe. This dialogue must bring together people from the perspectives of religion and the sciences as we realize that these two parallel, non-competing discourses are both trying in their own way to understand the depth of creation. Finally, the pope urges all people to become better educated about their environment and to cultivate a deeper covenant with Creation. This will manifest in a profound spirituality that cherishes and celebrates the love of God for all creatures.

The encyclical reveals that the pope is informed by up-to-date scientific research and data.[49] Although he does not explicitly cite planetary boundary theory, the pope addresses seven of the planetary boundaries.[50] These are:

- Climate change and the necessity to reduce greenhouse gases[51]

[49] The publication of *Laudato Si'* in 2015 followed closely after the joint workshop of the Pontifical Academy of Sciences and the Pontifical Academy of Social Sciences in May 2014. The workshop—"Sustainable Humanity, Sustainable Nature, Our Responsibility"—was the second time that the two academies had ever met together. The encyclical itself is neither purely environmental nor purely social, but holds these two disciplines in dialogue.

[50] At the workshop, Partha Dasgupta (professor emeritus of economics, Cambridge University), Jeffrey D. Sachs (director of the Earth Institute, Colombia University, NY), and Achim Steiner (executive director, UNEP and UN under-secretary-general) all referred to the theory of planetary boundaries. So it was no surprise that elements of the theory should appear in the encyclical. See Pontifical Academy of Sciences and Pontifical Academy of Social Sciences, *Sustainable Humanity, Sustainable Nature: Our Responsibility* (Vatican: Libreria Editrice Vaticana, 2015), available at https://www.pas.va/en/publications/extra-series/es41pas.html.

[51] In his 2023 apostolic exhortation on the climate crisis, *Laudate Deum* (section 17), Francis writes about critical points, which unleash cascading effects with

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- Biosphere integrity – which is addressed in an entire section of chapter one[52]
- Fresh water pollution (and commodification)[53]
- Biogeochemical flows, where he writes about pollution caused by fertilizers, soil acidity, etc.[54]
- Land system changes (deforestation, desertification and draining wetlands)[55]
- Atmospheric aerosol loading, where he writes about air pollution causing multiple health hazards and causing millions of premature deaths[56]
- Novel entities (without naming them as such) – "hundreds of millions of tons of waste, much of it non-biodegradable, highly toxic and radioactive" from multiple sources.[57]

Although the church is not beholden to any individual scientific theory, Pope Francis is entirely in line with modern climate-change research. He insists on the urgency to curb greenhouse gas emissions and to oppose exploration for, and extraction of, new fields of fossil fuels. The Vatican State is on target to have only electric vehicles in its

unpredictable outcomes. This notion is central to planetary boundary theory. Cf. also Francis, *Laudato Si'*, 169.

[52] Francis, *Laudato Si'*, 24, 32–34, 175.

[53] Francis, *Laudato Si'*, 48.

[54] Francis, *Laudato Si'*, 20. In paragraph 24, he specifically addresses the carbon cycle.

[55] Francis, *Laudato Si'*, 23, 51, 169, 8, 39, etc.

[56] Francis, *Laudato Si'*, 20.

[57] Francis, *Laudato Si'*, 21.

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fleet by 2030,[58] and to be the first "carbon-neutral" state in the world. But he is not content with having the Holy See represent a small island of good practice.

The pope is unambiguous that the present crisis stems from the human commodification of the planet. Everything is seen as a potential resource for human consumption, valorization, and trade. The pope identifies this as an excessive modern anthropocentrism[59]—the mentality that humans are the center and the purpose of every created thing, and that they may therefore take anything for themselves irrespective of the cost to the rest of the created universe. This self-centeredness disregards the fact that we are beneficiaries of what has been handed to us by the creator, from previous generations, and that we are meant to be responsible stewards on behalf of future generations. In this worldview, there is no space for gratitude or acknowledgement of the gifted-ness of nature.

In the rush to exploit the Earth's many resources, people have completely overlooked the damage this is causing to the planet itself. Deriving from a profound anthropological disorientation, this mentality leads to a "constant schizophrenia, wherein a technocracy which sees no intrinsic value in lesser beings coexists with the other extreme, which sees no special value in human beings."[60] Consequently, human beings and human relationships become disposable, and part of the "throwaway culture." When something or someone no longer has novelty or immediate utility, he, she, or it can be disposed of. Humans have not yet adopted the model of the natural world, which is a circular economy. This is why things become waste and end up polluting the air,

[58] Philip Pullella, "Vatican in Deal with Volkswagen for All-Electric Car Fleet by 2030," *Reuters*, 15 November 2023, https://www.reuters.com/sustainability/vatican-deal-with-volkswagen-all-electric-car-fleet-by-2030-2023-11-15.

[59] Francis, *Laudato Si'*, 116.

[60] Francis, *Laudato Si'*, 118.

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water, and land. No wonder that: "[t]he Earth, our home, is beginning to look more and more like an immense pile of filth."[61]

The pope's engagement with environmental issues is not limited to the publication of his first magisterial encyclical. He has addressed the Pontifical Academy of the Sciences at their regular meetings.[62] From these allocutions, it is clear that he considers the scientists' vocation to advance knowledge that can be put to the service of caring for humans and our environment. When meeting with members of the German Max Planck Institute in 2023, he repeated the age-old teaching of the church that there is a place for pure science, "that is uninfluenced by prejudices that are political or economic in nature."[63] This is knowledge of the universe for the sake of the knowledge itself, which can be used to give greater glory to the God of the universe.

[61] Francis, *Laudato Si'*, 20–22.

[62] For example, in his address to the plenary session of the Pontifical Academy of Science, Pope Francis appreciates how the members' concern for present and future generations is rooted in their great care for mother earth. He urges the members to promote sustainable development by "the full assuming of our human responsibilities regarding creation and its resources, as well as the search for social justice and the overcoming of an immoral system that produces misery, inequality and exclusion." See Francis, *"Address to Participants in the Plenary Session of the Pontifical Academy of Sciences,"* Speeches, 28 November 2016, https://www.vatican.va/content/francesco/en/speeches/2016/november/documents/papa-francesco_20161128_pontificia-accademia-scienze.html . In his address to the September 2022 plenary session of the same academy, he appealed for greater "ecological conversion" in order to "save our common home and life" rather than "increasing inequality, exploitation and destruction." "The drive toward scientific achievements… must always be directed to the needs of fraternity, justice, and peace, in order to help meet the great challenges facing our human family and environment." Cf. Sophie Peeters, "Pope to Pontifical Academy: 'Science Is a Tool for Peace,'" *Vatican News*, 2022, accessed 6 March 2024, https://www.vaticannews.va/en/pope/news/2022-09/pope-francis-science-as-tool-for-peace.html.

[63] Cf. Sophie Peeters, "Pope Says Science Should Be at the Service of Humanity," *Vatican News*, 25 February 2023, https://www.vaticannews.va/en/pope/news/2023-02/pope-science-must-be-at-the-service-of-humanity.html.

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As further testimony to his grave concern regarding climate change, Pope Francis wrote a special, brief apostolic exhortation, *Laudate Deum*, in 2023, entirely to urge people around the world to address the climate crisis with much greater seriousness. The issue of climate change requires the participants at the COP28 of the UNFCCC[64] (and subsequent COPs) to "be strategists capable of considering the common good and the future of their children, more than the short-term interests of certain countries or businesses."[65] He has very high expectations of political decision-makers and the decisions to be made at the national and international level and also expects the wider population to make cultural changes through their individual personal choices.[66]

In *Laudate Deum*, Pope Francis dedicates additional paragraphs to analysing the "growing technocratic paradigm."[67] Here he repeats his reflection from *Laudato Si'* that the increase of power at the disposal of human beings is not equitably shared, and that power ends up dangerously concentrated in the hands of a few people. We have witnessed in the past how this has led to greater potential for the misuse of power—such as the capacity to "decimate populations, drop atomic bombs and annihilate ethnic groups." An increase in technical potential has not been accompanied by a growth in ethical restraint. Thus we need to rethink our use of power, and apply it for the benefit of a healthy ecology. Pope Francis holds up the example of indigenous cultures which have been able to reshape their environment without destroying or endangering it. To this he contrasts the destructiveness

[64] This refers to the 28th Conference of the Parties (COP28) of the UN Framework Convention on Climate Change held in Dubai, November–December 2023.

[65] Francis, *Laudate Deum*: Apostolic Exhortation on the Climate Crisis (Vatican: Libreria Editrice Vaticana, 2023), 60. https://www.vatican.va/content/francesco/en/apost_exhortations/documents/20231004-laudate-deum.html.

[66] Francis, *Laudate Deum*, 69–70.

[67] Francis, *Laudate Deum*, 20–33.

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of the technological paradigm, which needs to learn to "include the interaction of natural systems 'with social systems'."[68]

Eco-action, Not Eco-anxiety

A survey of more than 10,000 people in 10 countries in 2021 found that:

> [r]espondents across all countries were worried about climate change… More than 50% reported each of the following emotions: sad, anxious, angry, powerless, helpless, and guilty. More than 45% of respondents said their feelings about climate change negatively affected their daily life and functioning, and many reported a high number of negative thoughts about climate change (e.g., 75% said that they think the future is frightening and 83% said that they think people have failed to take care of the planet). Respondents rated governmental responses to climate change negatively and reported greater feelings of betrayal than of reassurance.[69]

The above research was funded by AVAAZ. Their website adds a further observation about eco-anxiety: "These [survey] results are scary, but psychologists say it's not just affecting children. Climate anxiety is being felt by people of all ages everywhere."[70]

Pope Francis dedicated his November 2021 prayer intention to praying for people suffering from depression and anxiety. The Pope's Video website of that month indicates that "the COVID-19

[68] Francis, *Laudate Deum*, 27.

[69] Caroline Hickman et al., "Climate Anxiety in Children and Young People and Their Beliefs about Government Response to Climate Change: A Global Survey," *The Lancet Planetary Health* 5, no. 12 (Dec 2021): e863, https://doi.org/10.1016/S2542-5196(21)00278-3 . In addition to young people from European countries and the USA, the respondents included 1,000 individuals aged 16–25 from Nigeria, the Philippines, and India.

[70] Avaaz, "Briefing: What Is Climate Anxiety?," *Avaaz*, 2021, accessed 8 March 2024, https://secure.avaaz.org/campaign/en/climate_anxiety_briefing_2021/?slideshow.

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pandemic has had a major impact on mental health."[71] But the video omits to specifically refer to climate anxiety as a major source of mental disturbance, particularly among younger people who will live for decades with an ailing planet. Experience has shown that acknowledging that one is not alone in this, belonging to a network, and taking action are significant ways to overcome eco-anxiety.[72]

In one way or another, every September – the month of the liturgical Season of Creation – the intention of the Pope's Worldwide Prayer Network relates to the environment. For example, the intentions for September 2020 and 2021, respectively, were for "respect for the planet's resources" and for "an environmentally sustainable lifestyle."[73] For September 2019, the prayer intention focused on protecting the oceans, and the accompanying video specifically highlighted ocean plastic pollution, which had been brought to the attention of the pope by fishermen the previous month. This plastic pollution, he warns, will be the death of the oceans and, by extension, our own.

Rather than spreading doom, gloom, despondency, or anxiety about the state of the environment, Pope Francis encourages us to pray for a whole month for these concerns (and others). This empowers the person who takes the prayer intention seriously, perhaps motivating them—as prayer does—to take action according to their means, rather than sitting down and brooding. We must rise to the challenge

[71] See Francis. "People Who Suffer from Depression," *Pope's Worldwide Prayer Network*, November 2021, accessed 8 March 2024, https://thepopevideo.org/november-people-who-suffer-from-depression/.

[72] Cf. Green Schools Project UK, "What Is Eco-Anxiety and How Can We Help Combat It?," 29 April 2022, accessed 12 March 2024, https://www.greenschoolsproject.org.uk/2022/04/29/elementor-2248/. Suggested actions may include participating in community activities; changing lifestyles (e.g., reducing meat consumption, using fewer single-use plastics, cycling or walking); shifting investments away from fossil fuels; writing to politicians; reconnecting with nature; etc.

[73] See The Pope Video, https://thepopevideo.org.

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of prayer, followed by meaningful action. This will prevent us from succumbing to eco-anxiety.

Much of what scientists tell us about the state of global ecology is not good news. But Pope Francis engages these challenges with a faith-inspired, can-do attitude. In *Laudate Deum,* he puts a great deal of faith in ordinary people to do what is right and in climate change negotiators to have sufficient political will to make meaningful commitments. He sees the need to reconfigure multilateral institutions, giving them greater authority, to enhance their effectiveness.

To address deforestation, alone, there are international and governmental policies. At the multilateral level, the REDD+ mechanism of the UN aims to reduce emissions from deforestation and forest degradation, to sustainably manage forests and conserve forest carbon stocks in developing countries.[74] The international Great Green Wall Initiative is designed to restore 100 million hectares of hyperarid land across the Sahel region, and to create millions of green jobs.[75] At the national level, many countries are engaged in the African Forest Landscape Restoration Initiative (AFR100) to bring 100 million hectares of land in Africa into reforestation by 2030.[76] This is in line with the Bonn Challenge and with the African Union Agenda 2063 to achieve inclusive and sustainable socio-economic development over 50 years.

However, it is not all in the hands of our governments or the multinational corporations. In addition to the above-mentioned government-level projects, there is plenty that we ordinary citizens can do in Africa to stem the destruction of our habitat. On a more

[74] Cf. United Nations Framework Convention on Climate Change. "What is REDD+?," accessed 12 March 2024, https://unfccc.int/topics/land-use/workstreams/redd/what-is-redd.

[75] Cf. United Nations Convention to Combat Desertification, "Great Green Wall Initiative," accessed 12 March 2024, https://www.unccd.int/our-work/ggwi.

[76] Cf. AFR100, "People Restoring Africa's Landscapes," accessed 12 March 2024, https://afr100.org/.

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personal level, there are overpowering spiritual motivations, born out of faith, for a "pilgrimage of reconciliation with the world that is our home."[77] Pope Francis challenges every household "to reduce pollution and waste, and to consume with prudence," thereby generating a new counter-throwaway-culture.[78] We can move away from coal or charcoal as our primary source of fuel for cooking. Gas—including biogas—is a cleaner fuel which is healthier in the home, and in the case of biogas, is a renewable, rather than a fossil fuel. We can make sustained efforts to plant trees, and to ensure their growth and survival over many years. We do not just plant and forget about a tree. It needs to be cultivated and tended. As God settled our First Ancestors "in the garden of Eden to cultivate and take care of it,"[79] so it is deep in our DNA to be stewards and not destroyers of our common home.

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[77] Francis, *Laudate Deum*, 69.

[78] Francis, *Laudate Deum*, 71.

[79] Gen. 2:15.

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