THEOLOGICAL FOUNDATIONS FOR AGRICULTURE

According to *Laudato Si'*

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LSRI REPORT

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Highlights

The report unearths the key theological underpinnings in relation to agriculture contained in Pope Francis' encyclical, *Laudato Si': On Care for Our Common Home.*

- The principles of Integral Ecology as a paradigm are reflected upon as key alternative lenses with which to see the problems that industrialised models of agriculture present for the protection and flourishing of all present and future life.
- The report shows how Integral Ecology challenges dominant pre-conceived ideas of what agriculture is and should be in relation to all life and how it leads to a proactive engagement with alternative models of development including in particular, agroecology.
- The implications of theologically rooted critical analyses of agriculture in the light of Laudato Si' are discovered as new forms of resistance through examples from around the world.

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Introduction

The initial paragraphs of Pope Francis's 2015 encyclical *Laudato Si': On Care for Our Common Home* convey both the importance of agriculture as well as the challenge it presents. On the one hand, agriculture is indispensible to human life as we know it. This is signalled by the first lines of the encyclical that quotes St. Francis *Canticle of the Creatures*: "Praise be to you, my LORD [*Laudato si', mi' Signore*] through our Sister, Mother Earth, who sustains and governs us, and who produces various fruits with colored flowers and herbs" (§ 1).[1] Similar to how we depend upon our mothers for existence, so we depend upon the earth that sustains and governs our lives. Try as we might, we cannot

prescind from this dependence.

On the other hand, *Laudato Si'* attributes a good deal of the damage being done to the home we share with other creatures to the problem of agriculture, more precisely, to the particular form of it known as industrial agriculture. As we will see, rather than acknowledge our dependence upon the earth, industrial agriculture resists such dependence and seeks to overcome it. Rather than pattern agriculture upon an earthly and natural order given by God that we are called to learn from and collaborate with, industrial agriculture instead positions humans as the earth's "lords and masters" (*Laudato Si'*, § 2). Immense damage to our common home has been the consequence.

This report analyzes both the importance of agriculture as well as the problem of it through the lens of *Laudato Si'*. The report's primary aim is to elucidate the encyclical's vision of an agriculture that both tills and keeps the garden of the world, along with the underlying theological foundation of that vision. What follows proceeds in three main parts. The first part examines the problem of agriculture, that is, the damage industrial agriculture currently causes to our common home. The second looks at the theological foundations of agriculture according to *Laudato Si'* and examines the encyclical's agricultural vision. The third and final part turns to the field of agroecology and makes a case for how *Laudato Si'* aligns with that approach.

I. The Problem of Agriculture

The litany of damage associated with industrial agriculture is well-known and extensively documented.[2] This section briefly examines the problem of agriculture as it is presented by the first chapter of *Laudato Si'*, "What is Happening to Our Common Home," focusing especially upon industrial agriculture's effects upon pollution, climate change, water, and biodiversity loss.

Before examining industrial agriculture's effects, it is first necessary to say more about what it is, along with some of its defining features. As its name implies, industrial agriculture seeks to pattern agriculture upon industry so as to make "every farm a factory," in the words of the historian Deborah Fitzgerald.[3] The underlying rationale and basic philosophical commitments that have historically ordered it—that farms are like factories

Despite the promise of industrial agriculture to "feed the world," over 800 million people remain hungry today.

and their creatures like machines; that farmers should be like businessmen that maximize production for the sake of profit; that farming operations should be standardized, specialized, and scaled-up; that "efficiency" should be embraced; and so on—directly derive from industry.

Industrial agriculture first emerged in the 19th century with the Industrial Revolution. Since this time, such agriculture has had an epochal impact upon human life shaping the world as we know it. The story of industrial agriculture has been one of extraordinary advances in productivity, but also of profound social upheaval. Its establishment, for instance, continued and consolidated a revolution in forms of land tenure that had previously organized human life. Enforcement of owners' exclusive right to property and land enclosure dispossessed countless commoners, indigenous peoples, and other communities that once had rights to access and use land.[4] Since the 19th century, the rural exodus throughout the world and vast demographic shift to urban centres is a phenomenon that has been in part fueled by the advance of such agriculture and the productivity it made possible.[5]

Industrial agriculture has long been tied

to exploitative and degrading treatment of workers, as well as to a lack of land, housing, and work, all of which Pope Francis has critiqued, especially in his addresses to the World Meetings of Popular Movements.[6] In general, such agriculture fuels inequalities in the concentration of land and power within the agri-food system.[7] Unsurprisingly, despite the promise of industrial agriculture to "feed the world," over 800 million people remain hungry today.[8] As it turns out, the vast majority of these are smallholder farmers, agricultural workers, herders, and indigenous peoples who live in rural areas. Reasons for this situation include the difficulty in accessing or securing adequate land to farm and prices for crops that are too low to guarantee a living.[9]

Applying an industrial rationale to agriculture has produced a set of characteristic practices that interrelate and reinforce one another. As the agroecologist Stephen Gliessman lists them, these practices include:

- intensive, mechanized tillage
- specialization, and especially monoculture (growing a single crop, oftentimes at an extensive scale)
- irrigation of land from underground aquifers, reservoirs, or diverted rivers
- application of inorganic fertilizer
- chemical control of pests and weeds
- genetic manipulation of domesticated plants and animals
- and finally, confined animal feeding operations (or CAFOs).[10]

Gliessman explains the industrial ideal that integrates these various practices:

"Food production is treated like an industrial process in which plants and animals assume the role of miniature factories: their output is maximized by supplying the appropriate inputs, their productive efficiency is increased by manipulation of their genes, and the environments in which they exist as rigidly controlled as possible."[11] While industrial agriculture treat lands as factories of production and its creatures as raw materials, they are not. However, one consequence of the persistent attempt to do so has been damage to our common home, including to the natural sources that sustain creaturely life, as well as to agriculture's own ongoing productivity.[12]

Pollution

In *Laudato Si'*, Francis explains how industrial agriculture's extensive use of fertilizers, insecticides, fungicides, and herbicides, along with other forms of waste, leads to extensive pollution. Much of these materials are not only toxic but non-biodegradable, so they persist in the environment even as they contaminate it. They also bioaccumulate and biomagnify in food chains (§§ 20-21).[13] In some cases, environmental persistence of agrotoxins leads to levels of bioaccumulation and biomagnification that are lethal to humans and other animals.[14] In this regard, Francis repeatedly remarks upon industrial agriculture's contribution to water pollution, noting creaturely deaths attributable to chemical substances in water, as well as how water sources are increasingly being

disrupted by pollution from farming and related industrial activities (§§ 29, 41).[15]

Climate Change

Relatedly in *Laudato Si'*, Francis critiques the dominant model of development based on intensive fossil fuel consumption, a model that industrial agriculture exemplifies. The burning of fossil fuels releases carbon dioxide—the primary greenhouse gas emitted by humans—and other greenhouse gases into the atmosphere as waste (§ 23). Pollution from fossil fuel combustion not only has an enormous effect upon human mortality,[16] but it also traps excess heat from the sun in the atmosphere, contributing to the escalating climate crisis. Industrial agriculture is a prime example of this model of development.

Like all agriculture, industrial agriculture depends upon the natural energy flows from the sun, as well as the energy stored in the soils for the production of food and fiber. But in its efforts to industrialize food production, such agriculture also relies heavily upon fossil fuels for mechanization, agrochemical production and use, food processing and transportation, and so on.[17] All told, according to the Intergovernmental Panel on Climate Change (IPCC), pre- and post-production emissions in the global food system account for between 21–37% of total net greenhouse gas emissions.[18] Consequently, while industrial agriculture produces abundant food and other agricultural goods for human use, it also produces abundant waste—in this case, especially carbon dioxide, methane, nitrogen oxide, and other greenhouse gases.

Another, related way in which industrial agriculture contributes to climate change is through deforestation, forest degradation, and changes in land use (§

23). Worldwide, industrial agriculture is the key driver of deforestation and forest degradation.[19] When land is cleared for agriculture or livestock ranching or logged for timber, the release of carbon dioxide sequestered in the trees further contributes to global warming.

Soil and Water

Industrial agriculture also excessively consumes natural resources like soil and water. For instance, its extensive, mechanized tillage practices accelerate erosion by disturbing the soil and leaving it exposed to the elements. Erosion rates from conventionally-ploughed farms are 1-2 orders of magnitude higher than the rate of natural soil production, erosion under native vegetation, and geological erosion.[20] Worldwide, water consumption has reached unprecedented levels, and especially in the wealthier world, present levels of consumption and waste, Francis warns, cannot be sustained (*Laudato Si'*, § 27). In the U.S., for instance, the agriculture sector accounts for approximately 80% of the water consumed, according to the United States Department of Agriculture (USDA).[21] Globally, according to the Food and Agriculture Organization (FAO), agriculture consumes approximately 70% of all water.[22]

As we have already seen, water pollution as a consequence of agriculture is also a major problem (*Laudato Si'*, § 29). The sources of such pollution are various: excess nitrogen from over-fertilized fields, accumulation of manure from CAFOs, pesticides and other agro-toxins, and so on. Today, agro-toxins are routinely detected in rivers and streams,[23] and human exposure to pesticides is increasingly common throughout the world.[24]

Industrial agriculture exemplifies what Francis calls "a throwaway culture"—a culture that "quickly reduces things to rubbish" (§ 22).

Biodiversity

Industrial agriculture also drives biodiversity loss. Agrotoxins are responsible for the deaths of countless organisms that play important roles in the good functioning of ecosystems and which "give glory to God by their very existence," in the words of Francis (*Laudato Si'*, §§ 32-35). But apart from biodiversity loss related to pollution, agriculture, we saw above, is the major contributor to deforestation and forest degradation worldwide. This not only releases carbon dioxide into the atmosphere, but also leads to habitat fragmentation and loss. Oftentimes, what replaces these biodiverse habitats are monocultures of agricultural crops or trees (*Laudato Si'*, §§ 38-39). All told, because of pollution and the conversion of diverse, natural habitats to intensively-managed agricultural fields, industrial agriculture degrades biodiversity more than any other human activity.[25]

Throwaway Culture

We have been examining the problem of industrial agriculture as viewed through the lens of *Laudato Si'* and the extent to which such agriculture contributes to pollution, climate change, soil erosion, excessive water use, and biodiversity loss. Throughout the encyclical, industrial agriculture is continually cited as a primary example of the damage humankind is doing to our common home. In this regard, it exemplifies what Francis calls "a throwaway culture"—a culture that "quickly reduces things to rubbish" and that lacks the capacity or foresight to re-absorb and re-use its by-products, generating waste (*Laudato Si'*,§ 22). Whether it is the pollution of soil and water, the erosion of soil, the overconsumption of water, or emission of greenhouse gases, many

> “We cannot continue to produce and consume in the way we are doing.”

of the specific problems just discussed illustrate industrial agriculture's tendency to generate waste (*Laudato Si'*, §§ 32-35). In this connection, it is also noteworthy that, as Francis himself notes, approximately one third of all the food produced by such agriculture is—literally—thrown away (*Laudato Si'*, § 50).[26]

Technocratic Paradigm

Industrial agriculture's governance by what Francis calls the "technocratic paradigm" is one of the main reasons for the waste it generates. Drawing on Romano Guardini, Francis characterizes the technocratic paradigm as a regime of power rooted in a certain approach to technology and economy (*Laudato Si'*, § 16).[27] This paradigm's relentless focus on productivity effectively marshals science and technology to exert power over the world and its creatures, and to extract profit from them. It reduces the world and its creatures to what is of immediate utility to us, regarding them "as raw material to be hammered into useful shape," in Guardini's words, thereby ignoring the intrinsic value or worth of creation and its creatures.[28] Indeed, according to Francis, one of the hallmarks of the technocratic paradigm is a technique of mastery whereby the human subject, through scientific and experimental procedures, exerts possession and control over its objects, as if those objects had no integrity and were manipulable at will (*Laudato Si'*,§ 106). Because this paradigm regards the world of creatures primarily as a source of raw material, its associated culture devotes little thought or practical attention to the careful use of the sources it draws upon or the reabsorption and re-use of its by-products. Accordingly, this culture tends to waste what it uses, and its agriculture characteristically tills without keeping (*Laudato Si'*, §§ 21, 23, 34, 41).

"We cannot continue to produce and consume in the way we are doing."

Today, there is widespread agreement within the international scientific community and intergovernmental bodies that we are at a crossroads, and that alternative approaches to provisioning must be found that can mitigate climate change and that can help adapt communities to its effects.[29] Even a recent report sponsored by key protagonists within the industrial agriculture sector issues a dire warning. "We cannot continue to produce and consume food, feed, and fiber in the way we are doing today [without] destroying the planet," explains Sunny George Verghese, chief executive of Olam International Limited, a major supplier of cocoa beans, coffee, cotton, and rice, and a key contributor to the report. "The only way out for us is how we transition to a more resilient food system that will allow us to meet the needs of a growing population without the resource intensity we have today."[30] Significantly, as we see here, even some of the champions of industrial agriculture acknowledge its unsustainability and are in search of alternatives.

II. Theological Foundations for Agriculture according to *Laudato Si'*

Principles

We have seen how industrial agriculture is closely tied to the damage humankind is doing to our common home. But *Laudato Si'*, like the Catholic social teaching tradition more generally, does not simply diagnose the problem of agriculture, but also highlights its importance. In contrast to many eco-activists, their solution is not a "farm-free future" but rather an alternative agriculture.

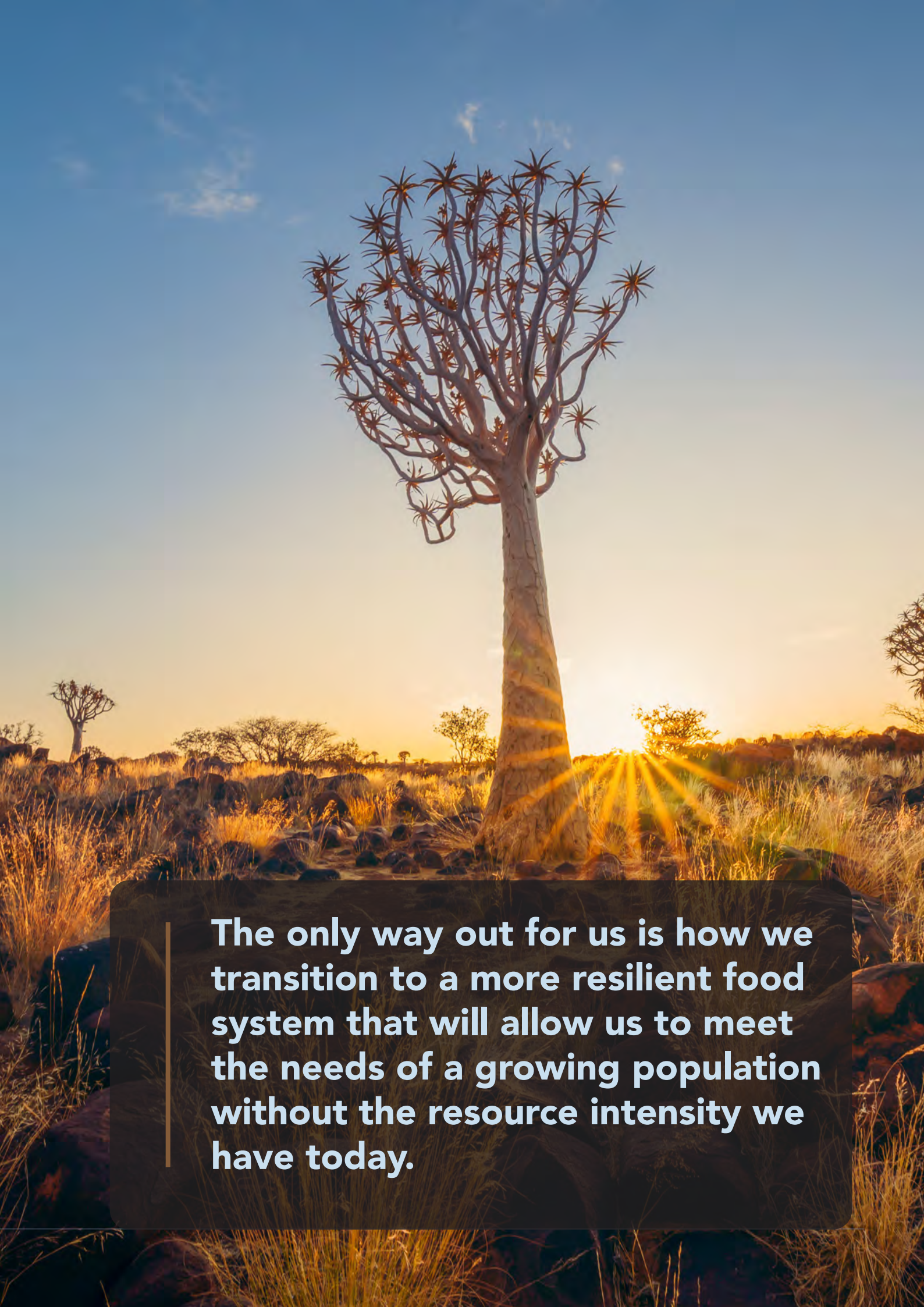
We see the outline of that alternative agriculture described in recent Catholic social teaching. One of the first key passages is this one from Pope Benedict XVI's 2009 encyclical *Caritas in Veritate*:

> The environment is God's gift to everyone, and in our use of it we have a responsibility towards the poor, towards future generations and towards humanity as a whole. …In nature, the believer recognizes the wonderful result of God's creative activity, which we may use responsibly to satisfy our legitimate needs, material or otherwise, while respecting the intrinsic balance of creation. …
>
> Nature expresses a design of love and truth. …Nature is at our disposal not as 'a heap of scattered refuse' [Heraclitus of Ephesus], but as a gift of the Creator who has given it an inbuilt order, enabling man [sic] to draw from it the principles needed in order 'to till and keep it' [Gen 2:15]. …[I]t is a wondrous work of the Creator containing a 'grammar' which sets forth ends and criteria for its wise use (§ 48).[31]

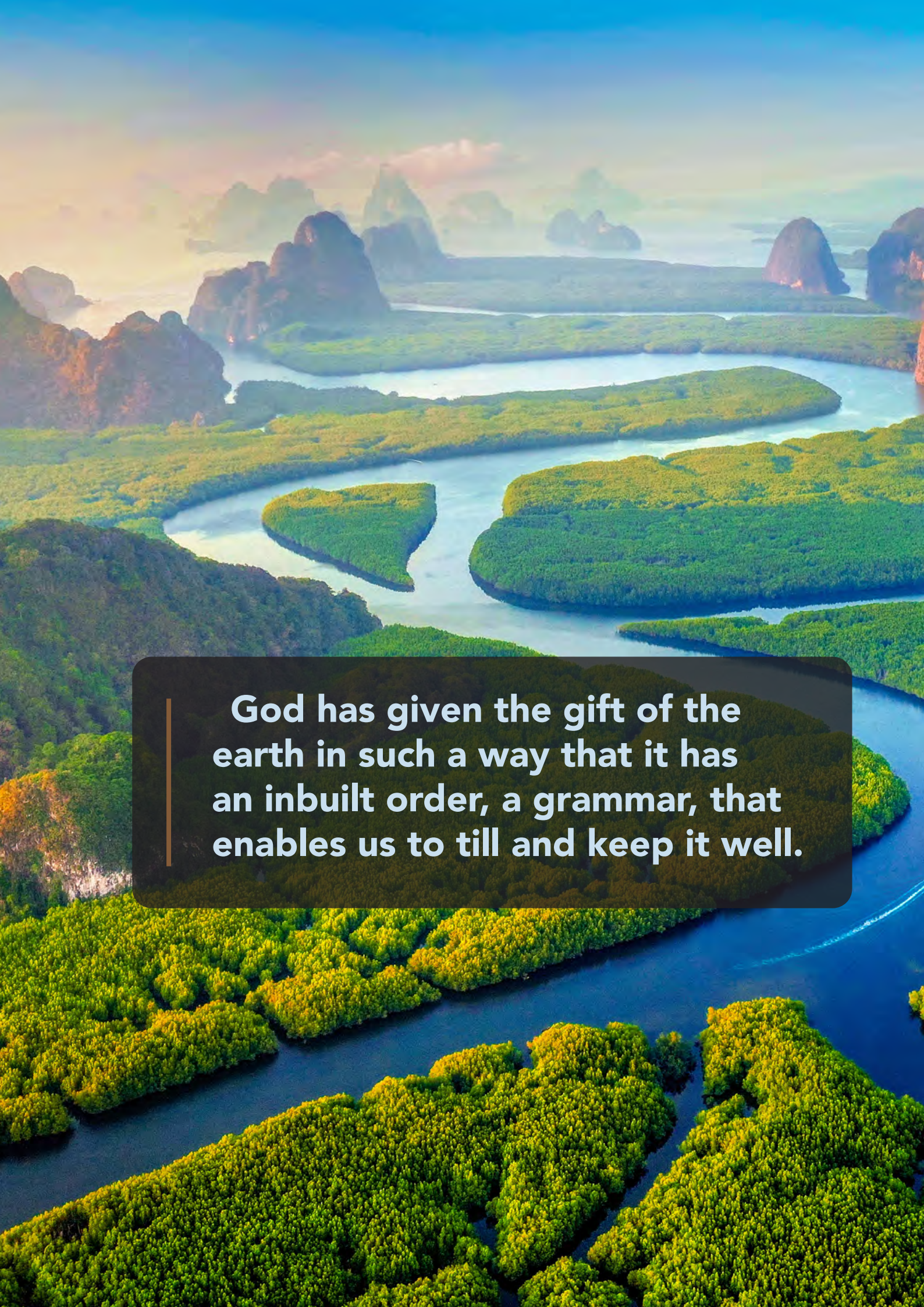
In this passage, Benedict articulates three foundational and closely connected theological convictions that are especially important to underscore and that serve as the touchstone for how the Catholic social teaching tradition during Francis's pontificate approaches agriculture:

1. *God is the Creator of heaven and earth and of all creation, including us.* Because all creatures—both human and other than human alike—are brought into being and sustained in existence by the Creator, God's relationship to them is an intimate one. One implication of this conviction is that God's relationship to other creatures is prior to and different from creatures' relationship to us. Another is that there is a fundamental distinction between Creator and creation, and all creatures, including humans, are related to each other by the bonds of creaturehood. Consequently, while there are important differences between humans and other creatures, there are also important similarities. As Francis writes in *Laudato Si'*, all creatures "are linked by unseen bonds and together form a kind of universal family, a sublime communion which fills us with a sacred, affectionate and humble respect" (§ 89). This statement is not hyperbole but derives directly from the doctrine of creation.

2. God creates the earth and all that it contains as a gift given in common, a gift that is meant for the use and enjoyment of all people. This is oftentimes referred to as the common or universal destination of created goods, and it is a conviction that shapes the Catholic social teaching tradition in its deepest structure.[32] Benedict's predecessor John Paul



The only way out for us is how we transition to a more resilient food system that will allow us to meet the needs of a growing population without the resource intensity we have today.



God has given the gift of the earth in such a way that it has an inbuilt order, a grammar, that enables us to till and keep it well.

II refers to it as "the first principle of the whole ethical and social order" and "the characteristic principle of Christian social doctrine."[33] Because the earth is a gift meant for the use of all and not for the exclusive use of some, this principle, as we will see, entails important claims of justice with respect to the use of the earth and its fruits. As Francis states in *Fratelli Tutti*, "The right to private property is always accompanied by the primary and prior principle of the subordination of all private property to the universal destination of the earth's goods, and thus the right of all to their use" (*Laudato Si'* § 123).

3. God has given the gift of the earth in such a way that it has an inbuilt order, a grammar, that enables us to till and keep it well. The creation and its creatures are not, as Heraclitus puts it, like a heap of scattered refuse, like raw materials to be used and then thrown away, as industrial agriculture tends to do. Rather, creation speaks to us the language of divine love. All creatures are the result of that love and therefore have message to communicate about it and its triune origin (*Laudato Si'*, §§ 33, 76-77, 84-85, 238-240).[34] First and foremost, this conviction about creation should lead us to regard it as mystery to be contemplated, which we see in St. Francis's request that "part of the friary garden always be left untouched, so that wild flowers and herbs could grow there, and those who saw them could raise their minds to God, the Creator of such beauty," as Pope Francis observes in *Laudato Si'* (§ 12). But more practically, this conviction also entails that the earth has an inbuilt order that provides us with the principles needed in order to till and keep it well, and that tending to the grammar of creation can guide our agricultural practice.

As we have already begun to see, the three foundational convictions articulated by Benedict in *Caritas in Veritate* continue to be affirmed by Pope Francis, who further develops their practical implications. Let us therefore further explore what Francis has to say about them.

Integral Ecology

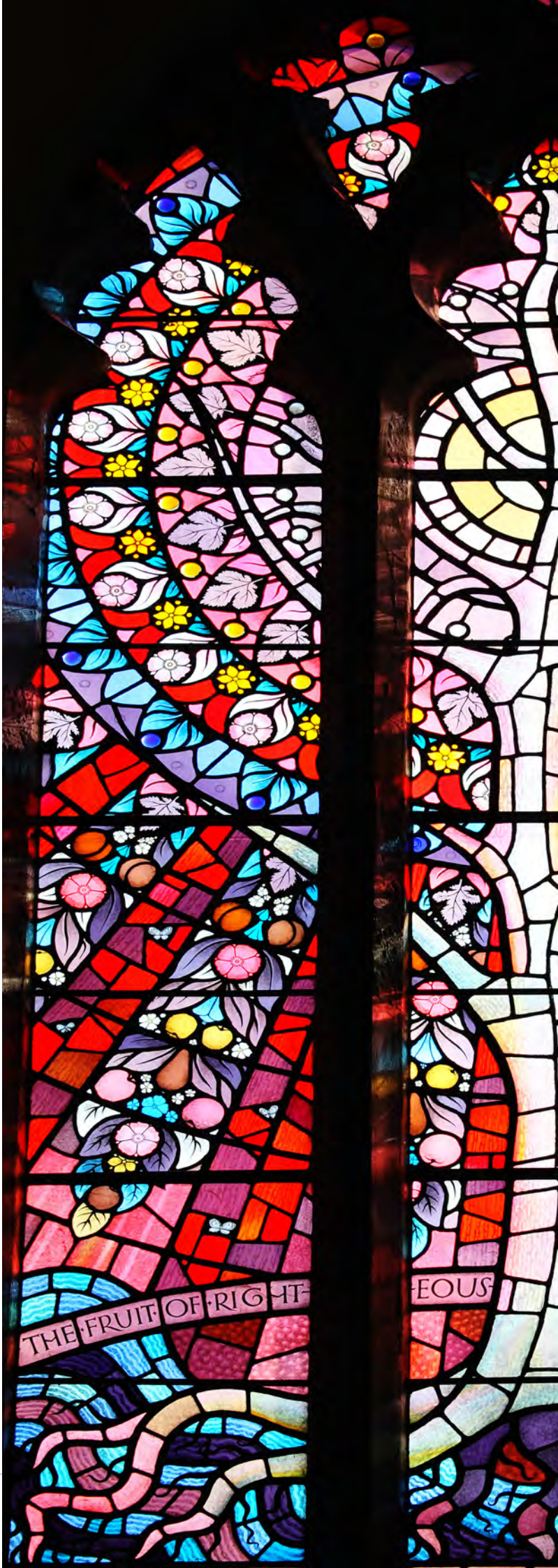
A key task of *Laudato Si'* as a whole is the development of an ecology capable of addressing the damage we are doing to our common home—what Francis characterizes as an integral ecology (§§ 10-11, 62-63). The theme of integral ecology has arguably received more critical engagement than any other from the encyclical.[35] Because Francis frames the three foundational and closely connected theological convictions described above in light of integral ecology, it is first necessary to say a word about it before turning to the approach to agriculture envisioned by *Laudato Si'*.

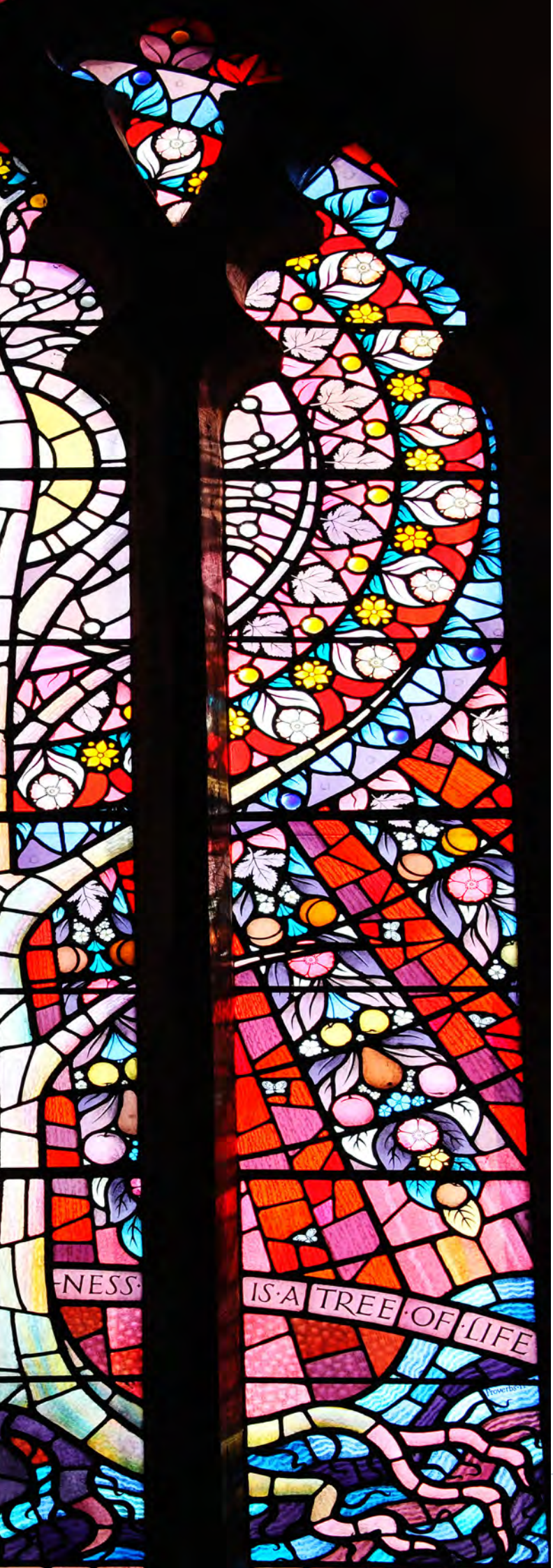
According to Francis, integral ecology seeks to reverse the damage we are doing to our common home, and it is an ecology that arises from God's work in Jesus Christ and in the Holy Spirit to heal the effects of sin and to draw creation into God's life. The theme of integral ecology emerges in *Laudato Si'* as part of Francis's critique of the technocratic paradigm, helping us to perceive how the products of technology are not

neutral tools that we can employ without consequence. Rather, technologies shape how we live, the world we inhabit, and the possibilities for action we imagine (*Laudato Si'*, §§ 107-108). To be clear, integral ecology does not minimize or reject science and technology as such. But it does refuse to accept uncritically the technocratic paradigm's promise that science and technology are neutral tools that will solve all our problems. At the same time, integral ecology holds that science and technology are not ends in themselves but should serve a vision of progress that is "healthier, more social, more human, more integral" (*Laudato Si'*, § 112).

Integral ecology thus points to a different, more holistic understanding of what it means to be human. The word "integral" is from the Latin integralis for "forming a whole," and the ecology of this whole is formed by three primary relationships that govern human life: with God, with our neighbours, and with the earth and other creatures (*Laudato Si'*, § 66).[36] Integral ecology situates human life within the context of these three relationships in order to foster a more holistic understanding of humankind's place and role upon this earth. By contrast to the technocratic paradigm, integral ecology positions us as creatures brought into being by the Creator. Similarly, while the technocratic paradigm teaches us to dominate the natural world and hoard its products, integral ecology teaches us to till and keep the creation like gardeners, as well as share the land and its harvests in justice.

What the foregoing suggests is that breaking from the technocratic paradigm and developing an integral ecology is not simply a matter of intellectual as-





sent or individual decision-making. It requires an ecological conversion (*metanoia*), a whole new way of seeing and inhabiting the world that heals and renews the three primary relationships of our lives. It also necessitates critical reappraisals of how we use technology, as well as changing our national and local laws and policies, transforming our institutions and structures, and envisioning new economic forms (see chapters 5 and 6 of *Laudato Si'*).

"We are not God."

Let us return to three foundational and closely connected theological convictions described above. As we have just seen, integral ecology is an ecology expansive enough to include our relationship to God. It is an ecology that presupposes the theological conviction that God is the Creator of heaven and earth, and that creation speaks to us the language of divine love. For Francis, it follows from this that "we are not God. The earth was here before us and was given to us" to till and to keep it (*Laudato Si'*, § 67). Put differently, the earth was not created by God for us to use and abuse in whatever way we wish. When human beings behave in this way, they effectively put themselves in the position of God, acting as they were the earth's lords and masters.

Because we are not God, when we act as though we are, imposing our own laws and interests upon reality, we deform our relationship to God, as well as the other primary relationships of our lives: to our neighbours, and to

the earth and its creatures. The consequence is damage to God's creation. As Francis explains, "a spirituality which forgets God as all-powerful and Creator is … how we end up worshiping earthly powers, or ourselves usurping the place of God, even to the point of claiming an unlimited right to trample his creation underfoot." However, we can recover a true sense of ourselves and our place in the world by recovering belief in the God "who creates and who alone owns the world." According to Francis, such a spirituality is fundamental to resisting the technocratic paradigm and its false claims of mastery (*Laudato Si',* § 75).

According to *Laudato Si'*, a true integral ecology calls for a spirituality that re-shapes our relationship to God, our neighbor, and the earth and its creatures. A number of initiatives have either grown directly out of Francis's encyclical (such as the Bethany Land Institute in Luweero, Uganda), or preceded the encyclical but exemplify the kind of agricultural approach he is calling for in it (such as the Mission of Mary Cooperative in Dayton, Ohio or the Misión Bachajon, in Chiapas, Mexico). In different ways, these initiatives seek to cultivate such a spirituality, and they are each described in greter detail in the Appendix.

Justice

God alone creates and sustains the earth, and so faith in this God unmasks the falsity of all other claims to absolute dominion, exposing those claims as idolatrous. Faith in this God also reveals that the earth and all that it contains is a gift given in common that is meant for the use and enjoyment of all people, the second foundational theological conviction discussed above. It follows from this that it is a matter of basic justice that all people have access to the goods of creation. On this basis, an integral ecology questions the inequalities and injustices generated by the concentration of land and power within the agri-food system. It listens both to the cry of the poor and the cry of the earth (*Laudato Si',* § 49).[37]

Francis's attentiveness to this twofold cry has led to a special sensitivity towards indigenous communities. These communities are not merely "one minority among others," as Francis says in *Laudato Si'*, "but should be the principal dialogue partners, especially when larger projects affecting their land are proposed" (§§ 146, 179). One reason indigenous communities have emerged as the principal dialogue partners for Catholic social teaching is precisely because the injustices they have faced, their long history of being annihilated, excluded, and discriminated against (see especially the discussion in the Appendix of the Misíon Bachajon located in the Mayan Tseltal indigenous community in Chiapas, Mexico).

During Francis's pontificate, the Amazon has been a locus of special concern.[38] In an address to indigenous people in Peru in 2018, for instance, Francis speaks of "the deep wounds that Amazonia and its peoples bear." This wounding continues

in the present in the "neo-extractivism and the pressure being exerted by great business interests that want to lay hands on its petroleum, gas, wood, gold and forms of agro-industrial monocultivation"—an agro-industrial extractivism that epitomizes the technocratic paradigm in its regard for Amazonia as "an inexhaustible source of supplies for other countries without concern for its inhabitants."[39]

But Francis also speaks of another threat the Amazonian peoples—like so many other indigenous communities—face, one that comes in the form of an environmentalism bent on conserving pristine nature without accounting for the indigenous peoples who oftentimes have long inhabited it and used it without degrading it. As Francis explains in the same address, "We know of movements that, under the guise of preserving the forest, hoard great expanses of woodland and negotiate with them, leading to situations of oppression for the native peoples; as a result, they lose access to the land and its natural resources. These problems strangle her peoples and provoke the migration of the young due to the lack of local alternatives."[40]

As we have seen, the environmentalism of the social teaching tradition opposes the untrammeled extractivism of industrial agriculture and the technocratic paradigm. But it also opposes the problematic form of environmentalism just described, one that pits the protection of pristine nature against people, especially against poor people, who depend upon lands, rivers, and forests for their livelihood, and

who have long used them without degrading them (*Laudato Si'*, §§ 146, 179).[41] This problematic form of environmentalism leads Francis to contend in *Laudato Si'* that "a true ecological approach always becomes a social approach; it must integrate questions of justice in debates on the environment" (§ 49). The environmentalism of social teaching holds that care of people and ecosystems are ultimately inseparable.[42]

Integral ecology thus charts a path beyond both the anthrocentrism of the technocratic paradigm that elevates humans as lords and masters over creation and a biocentrism that sees no special value in humans and regards them only as parasites upon nature (§ 118; on this point, see also *Caritas in Veritate*, §48). It is an ecology that holds creation as a gift given in common for the use and enjoyment of all people, to be used in moderation and shared with others in justice. This is another reason why indigenous communities have emerged as principal dialogue partner for Catholic social teaching: because so many of them embody alternative ways of living with and from the earth. As Francis states in his address in Peru, "Allow me to state that if, for some, you are viewed as an obstacle or a hindrance, the fact is your lives cry out against a style of life that is oblivious to its own real cost. You are a living memory of the mission that God has entrusted to us all: the protection of our common home."[43]

More generally, the integration of justice into debates about agriculture, land use, and ecology has been a longstanding feature of Catholic social teaching.[44] Since its inception, the social teaching tradition has challenged those who claim that the right to private property is absolute

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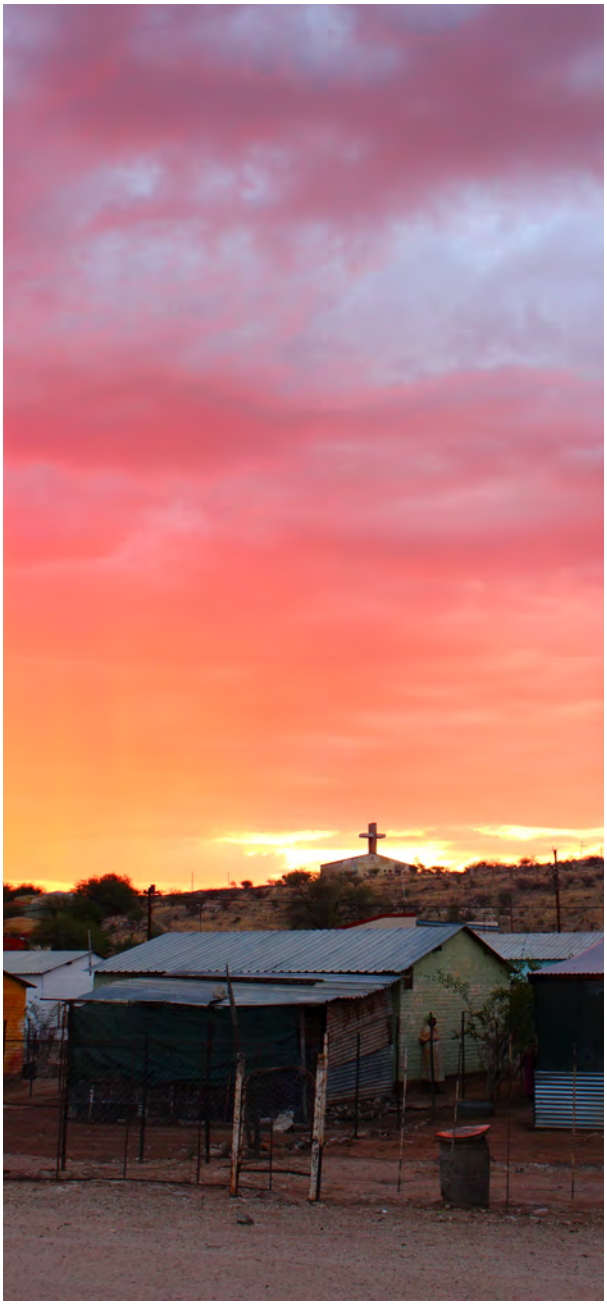
or inviolable, insisting upon property's social function. That social function can take different forms. One such form is the cooperative structure of the Mission of Mary Cooperative, another is the *ejido* system of the Misíon Bachajón (see Appendix).

We also see the Catholic social tradition's insistence upon property's social function in the tradition's longstanding advocacy for agrarian reform. Because the concentration of arable land had grown so much during the first half of the 20th century, the tradition began calling for a better distribution of land in the post-World War II period.[45] That advocacy has continued ever since, including in the pontificate of Pope Francis.[46] In *Laudato Si'*, Francis quotes the bishops of Paraguay who write, "Every *campesino* [peasant farmer] has a natural right to possess a reasonable allotment of land where he can establish his home, work for subsistence of his family and a secure life. … This means that apart from the ownership of property, rural people must have access to means of technical education, credit, insurance, and markets" (§§ 94, 113). The social function of property means that the right of all people to access sufficient land and created goods to survive and flourish takes precedence



over landowners' ability to amass more property and make it produce for profit.

Because creation and its fruits are given by God to sustain all people in justice, integral ecology also advocates for justice for agricultural workers and others who work the land, many of whom are among the most vulnerable people in the whole agri-food system.[47] Agricultural work should be dignified and justly remunerated. Similarly, integral ecology critiques visions of agricultural progress that involve laying off workers and replacing them with machines and other labour-saving technology, or relatedly, that compel workers and those dependent upon them to migrate to make ends meet (*Laudato Si'*, §§ 128, 154).

Fittingly, one important justice-related issue that Francis repeatedly raises about

the industrial agri-food system and its participation in a throwaway culture is the waste of food. We saw above that approximately a third of all food that is produced globally is wasted. In a world in which so many people suffer from a lack of food and basic necessities, this is a scandal and an injustice. "Whenever food is thrown out," Francis contends, "it is as if it were stolen from the table of the poor" (*Laudato Si'*, § 50, see also *Evangelii Gaudium*, § 53; *Fratelli Tutti*, § 189). Notice how the notion that wasted food is a form of thievery comes from the belief that creation is a gift meant for the use and enjoyment of all people that should be shared in justice. If creation is a common gift, the fact that some take in excess of their needs and then waste it is an injustice—and even, as Francis observes in the statement above, a kind of thievery.

As we have seen, integral ecology resists this throwaway culture and demands responses to the problem of food waste that forge new paths of solidarity and sharing.[48] Globally, many such responses have emerged, and there is a growing body of literature that studies them.[49] Caritas Internationalis, a confederation of Catholic relief and social service organizations operating throughout the world, has developed some innovative approaches.[50] But the key point for our purposes here is that while proponents of industrial agriculture frequently argue that increasing production through further breakthroughs in science and technology is necessary to feed a hungry world,[51] integral ecology holds that more attention should be devoted to minimizing food waste and equitably distributing the food that already is produced. Production is certainly important and necessary, but so, too, is reducing waste and pursuing justice within the agri-food system.

Exemplarity of natural ecosystems

The final theological conviction mentioned above—that the earth has an inbuilt order or grammar that enables us to till and keep it well—closely relates to the other two convictions just discussed. As we have seen, integral ecology understands the human creature as constituted by three primary relationships: with God, with our neighbours, and with the wider creation. It also regards the entirety of creation as brought into being by the Creator as a gift to be shared.

One implication of such an ecology for tilling and keeping the earth is that the commonality of the gift of creation extends across time. Tilling and keeping well means using the earth such that our future neighbours will be able to do so as well. In *Laudato Si'*, Francis quotes the bishops of New Zealand who ask, "What does the commandment 'Thou shall not kill' mean when twenty percent of the world's population consumes resources at a rate that robs poorer nations and future generations of what they need to survive?" (§ 95). While above we saw Francis suggest those who waste food and other goods of creation are like thieves, here the New Zealand bishops suggest that those who consume the world in ways that deprive future neighbours of what they need to survive are like killers. Of course, these are distinct forms of robbing and killing than those ordinarily prosecuted by criminal law. But learning to see and give language to such injustices is an important part of the integral ecology Francis tries to develop in *Laudato Si'*.

Following the New Zealand bishops, we must therefore ask: how do we use land so that future generations will not find its soil exhausted, its water depleted, and its habitat for other creatures eliminated? How do we build in ways that endure and from sources that are renewable? How do we make goods that are not designed to be discarded soon after they are made? How do we purchase in ways that support attentive and careful use of God's creation?

Laudato Si' contends that we can till as well as keep the earth responsibly by attending more closely to creation's inbuilt order or grammar. All the initiatives described in the Appendix are shaped by this conviction. In this regard, *Laudato Si'* frequently contrasts the technocratic paradigm and its throwaway culture with the model of natural ecosystems. In Francis's words: "It is hard for us to accept that the way natural ecosystems work is exemplary: plants synthesize nutrients which feed herbivores; these in turn become food for carnivores, which produce significant quantities of organic waste which give rise to new generations of plants" (§ 22). In contrast to the throwaway culture of the technocratic paradigm, nothing is wasted within ecosystems. Sunlight, water, and minerals supply the energy. The "waste" from living organisms does not accumulate and cause damage but is reabsorbed and reused by other living things.[52] Because of the ability of ecosystems to produce without wasting, *Laudato Si'* calls for "greater investment . . . in research aimed at understanding more fully the functioning of ecosystems" and their preservation, as well as for increased attention to "creation and its inherent laws" and the "message contained in the structures of nature itself" (*Laudato Si'*, §§ 42, 53, 69, 117, 190). Integral ecology envisions forms of human life and sociality that break with the technocratic paradigm and its throwaway culture, and that instead seek to model themselves upon the functioning of ecosystems.

III. The Promise of Agriculture

Engaging Agroecology

This section examines some further practical consequences of our exploration of the theological foundations of agriculture in *Laudato Si'* and in the Catholic social teaching tradition more generally. Specifically, we will examine the convergences between *Laudato Si'*s agricultural vision and that of the transdisciplinary field known as agroecology. As its name implies, agroecology seeks to model agriculture upon ecology rather than industry, and in so doing, offers an example of what the agricultural vision of *Laudato Si'* might look like more practically.[53] As we will see, there are striking convergences between agroecology and the agricultural vision of *Laudato Si'*, especially regarding the exemplarity of ecosystems and the struggle for justice in the agri-food system, topics we will examine in turn.

An Ecological Rationale in Agricultural Production

In *Laudato Si'*, Francis contrasts the technocratic paradigm and its mastery and manipulation of reality with a mode of human making that is "in tune with and respect[s] the possibilities offered by the things [of nature] themselves," "receiving what nature itself allow[s], as if from its own hand" (§ 106). This is an apt description of agroecology's approach to agriculture, which is one important convergence with *Laudato Si'* and the Catholic social teaching tradition more broadly understood.

Agroecology's appeal to the underlying nature and principles of agroecosystems sets it apart from the technocratic paradigm of industrial agriculture. We saw above that in responding to the throwaway culture, Francis finds a less wasteful alternative exemplified by natural ecosystems and calls for greater investment and research into their nature and functioning. "A serious consideration of this issue," Francis writes, "would be one way of counteracting the throwaway culture which affects the entire planet" (*Laudato Si',* § 22). Agroecologists have been seriously considering this very issue for decades as they have modeled agricultural systems upon natural ecosystems rather than upon industry.

As Miguel Altieri, one of the field's pioneers explains, agroecology seeks "to reinstate a more ecological rationale into agricultural production," a goal that requires "a deep understanding of the nature of agroecosystems[54] and the principles by which they function."[55] Along similar lines, another pioneering agroecologist, John Vandermeer, observes that agroecology's "central core" is the acknowledgement that "the agroecosystem is foremost an ecological system," and that "the fundamental natural laws of ecosystems are involved and need to be taken into account in the design and operation of the agroecosystem."[56]

In line with this, plant ecologist Judith Soule and botanist John K. Piper describe agroecology as "farming in nature's image."[57] In other words, instead of stamping the image of industry upon the landscape, as industrial agriculture does, agriculture should begin with study of ecological systems, striving to imitate them through the incorporation of ecological patterns and processes into agriculture. As Soule and Piper explain:

> Natural communities have been tailored by climactic and evolutionary forces to accommodate particular environments and to endure. They provide the best examples of the characteristics necessary for sustaining an agriculture that neither depletes the environment nor depends upon exhaustive resources. … These natural plant communities constitute the best structural fit to their native region and have much to teach about how to farm sustainably.[58]

Soule and Piper observe that most natural ecosystems are characterized by low levels of erosion, high species diversity in dynamic equilibrium, flora that is perennial and adapted to local conditions, exclusive reliance upon solar energy, internal recycling of nutrients, steady state biomass production, efficient energy transfer across food webs, herbivore and disease resistance, and so on. The basic idea of agroecology is that, through careful attention to ecosystemic structure and functioning, these processes and principles can be discerned and agriculturally imitated.

Soule and Piper focus on three agroecological practices in particular: (1) biological control and other forms of pest management, which attend closely to predator-prey and host-parasite relationships; (2) intercropping or cultivat-

> **Despite the promise of industrial agriculture to "feed the world," over 800 million people remain hungry today.**

ing multiple crops simultaneously, which enhances the efficiency of land use by taking advantage of different species' niches and the overyield potential of certain cropping combinations; and (3) conservation tillage, such as no-tillage or reduced-tillage, which attempts to minimize or even eliminate the frequency or depth of ploughing and so foster the formation of soil, and preserve and enhance the life within it.[59]

Of course, this list of practices is by no means exhaustive, and there is an extensive literature that examines agroecology's ecological rationale and enumerates the agricultural practices that exemplify it.[60] What is especially crucial to see is that agroecology as a field has been investing in and researching the functioning of ecosystems and attempting to pattern agriculture upon them for quite some time. Consequently, for those interested in *Laudato Si'*s agricultural vision, agroecology offers important tools regarding its practical implementation.

"A Key Form of Resistance to an Economic System that Puts profit Before Life"

We have been examining how agroecology's reliance upon an ecological rationale further specifies *Laudato Si'*s vision of an agriculture that, in Francis's words, learns from the exemplarity of ecosystems. But it is also important to remember that agroecology is more than a science that investigates ecological principles and processes in relationship to agriculture, and it is also more than an agricultural practice that integrates and works with those principles and processes. It is also a politics that struggles for justice in the agri-food system against powerful political and economic institutions and structures that work against those farmers and farming-communities whose agriculture embodies such an ecological rationale.[61] Agroecologists have long been aware of this fact, which is why, in addition to focusing on agricultural science and practice, agroecology also focuses on the politics of the struggle for justice within the agri-food system.[62] Although agroecology does not itself explicitly affirm the theological conviction that God gives creation as a

common gift for the use and enjoyment of all people, agroecology's political commitments and its conception of justice resonate with that conviction.

A good example of the political commitments of agroecology is the International Forum for Agroecology held in Nyéléni, Mali in 2015. This forum gathered representatives of diverse organizations and movements of "small-scale food producers and consumers, including peasants, indigenous peoples, communities, hunters and gatherers, family farmers, rural workers, herders and pastoralists, fisherfolk, and urban people."[63] The delegates begin their final declaration with the claim that it is smallholders and peasant communities—and not large-scale, industrial agriculture—that produce approximately 70% of the food consumed by humanity.[64] Francis states something similar in *Laudato Si'* when he observes that "there is a great variety of small-scale food production sys-

tems which feed the greater part of the world's peoples, using a modest amount of land and producing less waste, be it in small agricultural parcels, in orchards and gardens, hunting and wild harvesting or local fishing" (*Laudato Si',* § 129). Given the contribution of smallholders and peasant communities to feeding the world and caring for our common home, Francis urges public authorities to protect and support them, and he calls for the creation of new forms of cooperation and solidarity to defend them and to protect the local ecosystems that the poor depend upon (*Laudato Si',* §§ 22, 25, 34, 39, 125, 129, 140, 164, 180, 164).

But the delegates at Nyéléni also realize that despite these contributions to the common good, smallholder and peasant communities lack protection and support. Among the manifold threats to their existence, the Nyéléni declaration explicitly mentions recent waves of "land

grabbing"[65]—or large-scale land acquisitions by governments—a phenomenon that has surged in recent decades especially following the rise in commodity prices during the 2007-2008 global financial crisis that made investments in land much more valuable.[66] Significantly, much of the land targeted by investors is often already inhabited and used by communities like those represented at Nyéléni, as we saw above when discussing Amazonia.[67] Such communities' land tenure arrangements are often customary—or organized in accordance with their customs rather than well-defined and enforceable legally—which is one reason why such communities are vulnerable to dispossession and why their movements, as the delegates at Nyéléni themselves claim, are being criminalized.[68]

More generally, conflict related to land and natural resources is on the rise throughout the world. As Global Witness, a leading organization that monitors these conflicts, explains in its most recent report: "The worsening climate crisis and the ever-increasing demand for agricultural commodities, fuel, and minerals will only intensify the pressure on the environment—and those who risk their lives to defend it. More and more, non-lethal strategies such as criminalisation, harassment, and digital attacks are also being used to silence defenders."[69] In 2022, 177 defenders lost their lives, amounting to approximately 2,000 people since Global Witness first began its land and environmental defender campaign in 2012.[70] This is the context within which those at Nyéléni gathered, hence their belief that agroecology represents "a key form of resistance to an economic system that puts profit before life" and that willingly throws away people and produces waste.[71] This reality also shapes Nyéléni's political vision of putting "the control of seeds, biodiversity, land and territories, waters, knowledge, culture, and the commons in the hands of the peoples who feed the world."[72]

In these and other ways, for all those committed to the practical implementation of Catholic social teaching tradition's agricultural vision, the field of agroecology is a crucial interlocutor.

Conclusion

This report has examined the perils of agriculture, as well as the promise of it, through the lens of *Laudato Si'*. We have explored how industrial agriculture exemplifies the technocratic paradigm and its throwaway culture, and consequently, does damage to our common home. We have also seen how the encyclical envisions an agricultural alternative that has important affinities with agroecology, especially in terms of taking natural ecosystems as the model for agriculture and integrating a concern for social justice into debates about agriculture and the environment. For Francis, like for the larger Catholic social teaching tradition, this alternative agricultural vision is based on the interrelated theological convictions that (1) God is the creator of the earth and that the earth is God's, (2) that God gives the earth as a common gift meant for the use and enjoyment of all, and (3) that the created order has a grammar that can help us to till and keep it well. Taking these interrelated theological convictions seriously, as well as their agroecological implications, can help us learn to care for our common home.

For those committed to Catholic social teaching, taking seriously these theological convictions and their agricultural implications is a challenge requiring nothing short of an ecological conversion. But there is hope, because many of the practical implications of these convictions already find deep resonances among practitioners of agroecology and indigenous peoples across the world. In these diverse communities, adherents to social teaching encounter alternatives to the technocratic paradigm and its culture of waste. For this reason, *Laudato Si's* agricultural vision entails dialogue and solidarity with such communities as essential to the development of an integral ecology capable of caring for our common home.

For all those committed to the practical implementation of the Catholic social teaching tradition's agricultural vision, the field of agroecology is a crucial interlocutor.

Appendix:

Examples of Agricultural Initiatives on the Model of *Laudato Si'*

Mission of Mary Cooperative (Dayton, Ohio)[73]

Located in the Twin Towers neighbourhood of the inner east side of Dayton, Ohio, the Mission of Mary Cooperative (hereafter: the Mission) has transformed abandoned plots of urban land into gardens in order to spur the integral development of the surrounding neighborhoods. Founded in 2009 as a cooperative by a community of lay Marianists committed to the Catholic social teaching tradition and the Marianist charism,[74] the Mission has sought to address two pressing problems confronting the neighbourhood: abandoned land and lack of access of local residents to fresh, nutritious produce.

The Mission responded by buying the lots and converting them to vegetable gardens to make the harvest accessible to neighbours in various ways. The Mission has a two-tiered community supported agriculture operation in order to facilitate food access for those who need it most, and it sells food in local markets, all with the help of an organized network of community volunteers. The Mission grows vegetables year-round on around four acres of land, producing tens of thousands of pounds of produce. In addition to its own market gardens, the Mission also rents garden beds to community members, and has a programme that trains and equips families to start their own backyard gardens, empowering them to share what they have learned in workshops that train other community members.

Together with the University of Dayton, as well as other local schools and church and community groups, the Mission operates an Urban Sustainability Learning Center that offers opportunities for experimental learning and applied research related to urban land stewardship, community engagement, urban farming, and sustainable agriculture. In its infrastructure and operations, the Mission relies upon renewable energy (solar and geothermal) and is net-zero. It also supports various efforts in surrounding

neighbourhoods towards increasing energy efficiency.

The Mission explicitly describes its core commitments in terms of an integral ecology that promotes integral human development for peoples, as well as the care of other creatures. It seeks the flourishing of the people of the neighbourhood, working to honour the inherent dignity of each person, recognizing their gifts and providing resources and support to help develop them. In the words of the Mission, its integral ecology is especially attentive to "the voices of those at the margins of the neighborhood—people who experience poverty, unemployment, violence, and isolation," as well as the land upon which they live and from which they draw their lives.

Misión Bachajon (Chiapas, Mexico)

The Misíon Bachajon (hereafter MB), in Chiapas, Mexico, was founded by the Jesuits in 1958 when they offered to go to a poor, indigenous area in Mexico, and Lucio Torreblanca, the bishop of Chiapas, sent them to Bachajón, a mostly indigenous Mayan Tseltal community in central Chiapas.[75] Since that time, the Jesuits and local leaders have sought to revitalize Tseltal language and culture, and in so doing, build an autochthonous church with a preferential option for the poor.

Central to this process was the struggle for land reform in the 1990s that sought to recover land from the cattle ranching that had taken over much of Tseltal territory since the 1940s. Because of the success of the struggle, approximately 500,000 ha of land was legally transferred from private estates to indigenous smallholders. The thousands of households that comprise the MB now have access to land as part of an ejido system, a community-based form of land tenure, which preserves the property's social function.

On this land, households practice agroecological management of the milpa (the traditional maize, bean, and squash polyculture found throughout the Americas[76]) for subsistence. Households also have kitchen gardens and livestock yards, and they also rely on beekeeping, foraging, hunting, and fishing. Besides subsistence agriculture, many households also practice agroecological management of organic, shade-grown coffee, which is often their primary source of cash income (Chiapas is Mexico's top coffee-producing state).

Since 2001, the MB has developed a powerful strategy to achieve better terms of

trade in the global value chain of coffee through a cooperative that has pursued vertical integration. It is estimated that smallholder producers who sell parchment coffee (minimally processed beans that are washed and dried but still retain the yellowish layer of parchment) retain approximately 5% of the total value of the coffee value chain. Because of their poor position in the coffee value chain, smallholder coffee producers often also face downward pressure on prices as well as price volatility—a predicament that has steadily shifted power away from producers toward those higher in the coffee value chain (processors, roasters, exporters, and retailers).

As a constructive response, the MB has pursued a path of strategic upgrading in the coffee value chain through vertical integration, adding value to their coffee. One way the MB has done this is through certification programmes (organic, fair-trade, and shade-grown). Another is that the MB has reinvested profits from coffee sales into the community, and Yomol A'tel ("Together we Work/Walk/Dream" in Tseltal), a group of social and solidarity enterprises,[77] is the result.[78] Yomol A'tel now owns a coffee processing plant, which processes and roasts coffee, and it trains community members as "coffee cuppers" (professional tasters). Yomol A'tel has a specialty coffee-shop on-site, and it has also established a chain of coffee shops (once again, run by community members) in elite universities throughout Mexico, while also exporting directly to in the U.S. and Spain. Significantly, Yomol A'tel also has its own brand for its coffee and shops—Capeltic ("Our Coffee" in Tseltal)—and has developed a sophisticated marketing strategy. In these and other ways, the MB has not only helped its smallholders to capture more of the coffee value chain. It has also taken steps to replicate this model elsewhere.

Bethany Land Institute (Luweero, Uganda)

Founded in 2012 in Luweero, Uganda by Frs. Emmanuel Katongole, Cornelius Ssempala, and Anthony Rweza, the Bethany Land Institute (BLI) is a formation programme in integral ecology that draws explicit inspiration from Pope Francis's *Laudato Si'*.[79] Currently sitting on 367 acres of land gifted by the local bishop that includes demonstration gardens, established forests, and newly planted trees, the BLI is a school for ecological conversion and creation care. The fully organic campus is committed to producing zero waste.

In light of the analysis of *Laudato Si'*, Katongole, Ssempala, and Rweza came to see that many of the most pressing problems rural Uganda faces—deforestation, environmental degradation, food insecurity, and poverty—are all interconnected,[80] and that these interconnected problems called for an interconnected response. Focusing in particular upon Francis's claim in *Laudato Si'* that "ecological culture cannot be reduced to a series of urgent and partial responses to the immediate problems of pollution, environmental decay, and the depletion of natural resources. There needs to be a distinctive way of looking at things, a way of thinking, policies, an educational programme, a lifestyle and a spirituality which together generate resistance to the assault of the technocratic paradigm" (§ 111), they founded BLI. It aimed to demonstrate the kind of integral ecology the encyclical calls for.

The heart of the BLI is the "caretakers of the earth" programme, an intensive two-year residential scheme where students from rural areas of Uganda train in agroecology, agroforestry, economics, and spiritual formation. In scripture, Bethany is a place of refuge for Jesus, as well as the home of his friends, Mary, Martha, and Lazarus. The BLI is named after this place and the core components of the caretakers of the earth programme are likewise named after its residents:

Mary's Teaching Farm, which conducts educational and mentorship programmes in agroecological practices of land use and food production.

Lazarus's Trees, a reforestation programme that seeks to serve as a catalyst for a major countrywide reforestation effort and to help foster the ecological conversation of Ugandans.

Martha's Market, a savings and credit cooperative organization that trains BLI caretakers in economic entrepreneurship, among other ways, by managing and operating markets for the produce of BLI.

Upon completion of their training, the caretakers of the earth commit to returning to their villages and training four apprentices, freely sharing their knowledge with anyone who asks and by so doing helping to establish an ever-expanding network of caretakers of the earth. Additionally, for years, the local bishop has sent seminarians to BLI as part of their formation process, and BLI is currently in talks with the Uganda Episcopal Conference do the same for every seminarian in the country.

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Endnotes

1 *Thanks to Séverine Deneulin, Jenny Howell, Timothy Howles, Austen Ivereigh, Peter Rožič, and Norman Wirzba for their helpful comments on previous drafts of this report. Francis of Assisi, "*Canticle of the Creatures*", 113–14. Francis, *Laudato Si'*. Unless otherwise indicated, all documents of the Catholic social teaching tradition can be found at www.vatican.va

2 One of the best treatments of this topic is Kimbrell, *Fatal Harvest: The Tragedy of Industrial Agriculture*.

3 Fitzgerald, *Every Farm a Factory*, 10–32.

4 Mazoyer and Roudart, A History of World Agriculture, 314–15, 332–51, 467–68; Neeson, Commoners; Whelan, *Blood in the Fields: Óscar Romero, Catholic Social Teaching, and Land Reform*, 42–65.

5 According to one study, in 1800, approximately 90% of the world's population lived in rural settings. Today, over half of the world's population lives in urban areas. See Ritchie and Roser, *"Urbanization."*

6 Francis I, *"Address to the Participants in the World Meeting of Popular Movements"*

7 Shiva, *The Violence of the Green Revolution*; Thompson and Wiggins, *The Human Cost of Food*; Hendrickson et al., *"The Food System: Concentration and Its Impacts."*

8 Food and Agricultural Organization, *"The State of Food Security and Nutrition in the World 2022."*

9 Mazoyer and Roudart, A History of World Agriculture, 9–10; de Schutter, *"Access to Land and the Right to Food"*; UN Millennium Project, *"Halving Hunger: It Can Be Done"*, 4–6.

10 Gliessman, *Agroecology*, 1–7.

11 Gliessman, *Agroecology*, 3.

12 Millennium Ecosystem Assessment, Ecosystems and Human Well-Being: Synthesis; Rockström et al., *"A Safe Operating Space for Humanity"*; Campbell et al., *"Agriculture Production as a Major Driver of the Earth System Exceeding Planetary Boundaries"*; Balmford et al., *"The Environmental Costs and Benefits of High-Yield Farming."*

13 Popularized in Rachel Carson's *Silent Spring*, the term *"bioaccumulation"* refers to a process whereby toxins are absorbed by the body at faster rates than they are lost. See Carson, *Silent Spring*; Davis, Banned.

14 Gupta and Gupta, *"Bioaccumulation of Pesticides and Its Impact on Biological Systems."* See also Alengebawy et al., *"Heavy Metals and Pesticides Toxicity in Agricultural Soil and Plants."*

15 Moss, *"Water Pollution by Agriculture."*

16 Vohra et al., *"Global Mortality from Outdoor Fine Particle Pollution Generated by Fossil Fuel Combustion."*

17 Woods et al., *"Energy and the Food System."*

18 Intergovernmental Panel on Climate Change, Climate Change and Land.

19 Kissinger, Herold, and de Sy, "Drivers of Deforestation and Forest Degradation: A Synthesis Report for REDD+ Policymakers."

20 Montgomery, *"Soil Erosion and Agricultural Sustainability."*

21 *"National Water Quality Inventory."*

22 FAO, *The State of the World's Land and Water Resources for Food and Agriculture – Systems at Breaking Point.*

23 Covert et al., *"Pesticide Mixtures Show Potential Toxicity to Aquatic Life in U.S. Streams, Water Years 2013-2017."*

24 Chiu et al., *"Comparison of Questionnaire-Based Estimation of Pesticide Residue Intake from Fruits and Vegetables with Urinary Concentrations of Pesticide Biomarkers."*

25 Dudley and Alexander, *"Agriculture and Biodiversity: A Review"; United Nations Convention to Combat Desertification, "Global Land Outlook";* Lymbery, Dead Zone. We live in an age of ecocide—the sixth extinction—with species loss at a rate unparalleled in human history. The current mass extinction, which is thousands of times above the background rate, can only be compared to cataclysmic extinctions millions of years ago. Chivian and Bernstein, *Sustaining Life*; Kolbert, *The Sixth Extinction.*

26 For this and other figures on food waste, see Food and Agriculture Organization, *"Food Wastage Footprint: Impact on Natural Resources."*

27 Scott, *Seeing like a State*; Henke, *Cultivating Science, Harvesting Power: Science and Industrial Agriculture in California; Leguizamón, Seeds of Power.*

28 Guardini, *The End of the Modern World,* 55–56.

29 International Assessment of Agricultural Knowledge, Science, and Technology for Development, *Agriculture at a Crossroads: The Global Report*; de Schutter, *"Report Submitted by the Special Rapporteur on the Right to Food"*; International Panel of Experts on Sustainable Food Systems, "*From Uniformity to Diversity: A Paradigm Shift from Industrial Agriculture to Diversified Agroecological Systems"*; High Level Panel of Experts on Food Security and Nutrition, *"Agroecological and Other Innovative Approaches for Sustainable Agriculture and Food Systems That Enhance Food Security and Nutrition."*

30 Rushe, *"Big Agriculture Warns Farming Must Change or Risk 'Destroying the Planet.'"* The report to which the article refers can be found here: https://www.sustainable-markets.org/terra-carta/

31 Benedict XVI, *Caritas in Veritate.*

32 Whelan, *Blood in the Fields: Óscar Romero, Catholic Social Teaching, and Land Reform*, 85–142.

33 John Paul II, *Laborem Exercens*, § 19; John Paul II, *Sollicitudo Rei Socialis,* § 42.

34 Cardinal Víctor Manuel Fernández, *"Alcuni Suggerimenti per Pensare La Creazione Come Mistero Cristologico-Trinitario."*

35 See, for instance, Castillo, *"Integral Ecology as a Liberationist Concept"*; Marx, *"'Everything Is Connected'"*; Kelly, Laudato Si; Magill and Potter, *Integral Ecology: Protecting Our Common Home*; Deane-Drummond, "Pope Francis's *Integral Ecology Paradigm."*

36 Deane-Drummond, *"Pope Francis's Integral Ecology Paradigm,"* 102.

37 Latour, *"The Immense Cry Channeled by Pope Francis."*

38 On this point, see especially Francis, *Querida Amazonia.*

39 Francis I, *"Meeting with Indigenous People of the Amazon Region in the 'Coliseo Regional Madre de Dios.'"*

40 Francis I. "*Meeting with Indigenous People of the Amazon Region in the 'Coliseo Regional Madre de Dios.'"*

41 For more on different varieties of environmentalism, see Martinez-Alier, *"The Environmentalism of the Poor."*

42 Whelan, *"Why Catholics Aren't Environmentalists (of a Certain Sort)."*

43 Francis I, *"Meeting with Indigenous People of the Amazon Region in the 'Coliseo Regional Madre de Dios,'"* 1.

44 Celia Deane-Drummond helpfully observes that, within the Catholic social teaching tradition, *"a particular concern with issues of social justice shapes the way environmental problems are addressed."* See Deane-Drummond, *"Joining in the Dance: Catholic Social Teaching and Ecology,"* 193, 210–11.

45 Whelan, *Blood in the Fields: Óscar Romero, Catholic Social Teaching, and Land Reform*.

46 Francis I, *"Address to the Participants in the World Meeting of Popular Movements."*

47 Rothenberg and Coles, *With These Hands*; Thompson and Wiggins, *The Human Cost of Food*; Holmes and Bourgois, Fresh Fruit, *Broken Bodies*.

48 Francis I, *Catechesis*, June 5, 2013, see: https://www.vatican.va/content/francesco/en/audiences/2013/documents/papa-francesco_20130605_udienza-generale.html

49 Davies et al., *"Making Visible"*; Michelini, Principato, and Iasevoli, *"Understanding Food Sharing Models to Tackle Sustainability Challenges"*; Falcone and Imbert, *"Bringing a Sharing Economy Approach into the Food Sector."*

50 Tagle, *"The Problem of Food Loss: Challenges from the Catholic Social Teaching and Responses from Caritas."*

51 Borlaug, *"Feeding a Hungry World."*

52 The notion of "waste" as unserviceable material remaining from any process of manufacture is largely inapplicable and closely connected to the linear, "open" industrial systems that emerged in the nineteenth century. In such systems, materials are extracted from the earth and converted into industrial products and by-products that are commodifiable, as well as into waste, which is what is not commodifiable at any given time and place. Strasser, *Waste and Want: A Social History of Trash*, 14–15.

53 Catholic social teaching is self-consciously theological-moral in genre, and an implication of this is that the tradition claims no specific competence in the realms of agricultural science, practice, and policy. See John Paul II, *Sollicitudo Rei Socialis*, § 41; Paul VI, *Octogesima Adveniens*, § 4. But *Laudato Si'* does offer general orientation, suggesting certain approaches like industrial agriculture are problematic while also envisioning alternative agricultural futures. For its part, while agroecology is a transdisciplinary field, it does not yet include explicit theological engagement, so agroecology typically does not invoke or rely upon the kind of theological language ("Creator," "creation," "gift," and so on) characteristic of social teaching. The ecology encompassed by the field of agroecology is expansive and can perhaps even be characterized as integral, but it is not integral in the sense of *Laudato Si'* of including humankind's relationship to God within it.

54 An agroecosystem is a food production system, such as a farm or a garden, understood as a kind of ecosystem.

55 Altieri, *Agroecology*, ix.

56 John H. Vandermeer, *The Ecology of Agroecosystems* (Sudbury, Massachusetts: Jones and Bartlett Publishers, 2011), xiii; Stephen R. Gliessman, *Agroecology, The Ecology of Sustainable Food Systems* (New York: CRC Press, 20076), 18.

57 In this regard, agroecology relates to the more general approach to human making known as biomimesis (from the Greek bios, meaning life, and mimesis, meaning imitation). Janine M. Benyus, *Biomimicry: Innovation Inspired by Nature* (New York: Quill, 1997), 11–58.

58 Soule and Piper, *Farming in Nature's Image: An Ecological Approach to Agriculture*, 123–57.

59 Soule and Piper, 128–33.

60 Altieri, Agroecology; Gliessman, *Agroecology;* Vandermeer, *The Ecology of Agroecosystems*; High Level Panel of Experts on Food Security and Nutrition, *"Agroecological and Other Innovative Approaches for Sustainable Agriculture and Food Systems That Enhance Food Security and Nutrition."*

61 For a good discussion of the way government agricultural policy disincentivizes approaches like agroecology, see Montgomery, *Growing a Revolution: Bringing Our Soil Back to Life*, 51–65, 142–65.

62 On the politics of agroecology, see Rosset and Altieri, *Agroecology*. On agroecology as a science, practice, and politics, see High Level Panel of Experts on Food Security and Nutrition, *"Agroecological and Other Innovative Approaches for Sustainable Agriculture and Food Systems That Enhance Food Security and Nutrition."* For a good discussion of the way government agricultural policy disincentivizes approaches like agroecology, see *Montgomery, Growing a Revolution: Bringing Our Soil Back to Life*, 51–65, 142–65.

63 *"Declaration of the International Forum for Agroecology"* 163.

64 *"Declaration of the International Forum for Agroecology"* 163. Others have estimated that such communities produce up to 80%. See, for instance, International Fund for Agricultural Development and United Nations Environmental Program, *"Smallholders, Food Security, and the Environment."* For recent debates about these percentages, see ETC Group, *"Small-Scale Farmers and Peasants Still Feed the World."*

65 *"Declaration of the International Forum for Agroecology"* 163.

66 The 2007-2008 financial crisis combined with the subsequent rise in and volatility of food prices prompted governments and other actors to look for ways to bolser their access to food. This "rediscovery" of agriculture led to an increase of

such large-scale land acquisitions. For more on this phenomenon, see Deininger and Byerlee, *Rising Global Interest in Farmland: Can It Yield Sustainable and Equitable Benefits?*; Stephens, *"The Global Land Grab: An Analysis of Extant Governance Institutions"*; Rulli, Saviori, and D'Odorico, *"Global Land and Water Grabbing"*; Brilmayer and Moon, *"Regulating Land Grabs"*; Yang and He, *"Global Land Grabbing." An organization that monitors land grabbing worldwide* is: https://landmatrix.org

67 Dell'Angelo et al., *"Commons Grabbing and Agribusiness."*

68 "Declaration of the International Forum for Agroecology," 165; Lay et al., *"Taking Stock of the Global Land Rush: Few Development Benefits, Many Human and Environmental Risks."*

69 Global Witness, *"Standing Firm: The Land and Environmental Defenders on the Front Lines of the Climate Crisis."*

70 https://www.globalwitness.org/en/campaigns/environmental-activists/

71 *"Declaration of the International Forum for Agroecology,"* 164.

72 *"Declaration of the International Forum for Agroecology,"* 165.

73 This description of the Mission of Mary Cooperative relies upon https://www.missionofmary.org/ and conversations with cooperative member and leader, Rob Brodrick.

74 An essential aspect of that charism is being called by God, formed by Mary, and sent on mission by the Spirit to foster Christ's presence in the world. See Giardino, *The Promise and the Path: Starting and Sustaining Marianist Communities.*

75 The following account is based primarily on the excellent dissertation of Travieso, "*Reason to Hope: Economic, Social and Ecological Virtuous Circles in Chiapas, Mexico,"* 74.

76 Fonteyne et al., *"Review of Agronomic Research on the Milpa, the Traditional Polyculture System of Mesoamerica."*

77 *"What Is the Social and Solidarity Economy?"*

78 There is a coffee and honey producers' cooperative (Ts'umbal Xitalha'), a coffee processing plant (Bats'il Maya), a chain of coffee shops (Capeltic) a microfinance institution (Comon Sit Ca'teltic), a honey distributor (Chabtic), and a cooperative that makes honey-based soaps (Yip Antsetik).

79 The following account is based upon personal communications with Fr. Emmanuel Katongole, the BLI website (https://bethanylandinstitute.org/), and the article by John Nagy, *"Start Small,"* Notre Dame Magazine, Summer 2023.

80 In recent decades, for instance, Uganda has experienced both rapid population growth and one of the highest rates of deforestation in the word, as households fell trees for firewood and clear land for unsustainable farming. *"Testing the Effectiveness of Payments for Ecosystem Services to Enhance Conservation in Uganda | IPA."* The lack of viable economic activities, especially for the youth, only fuels these negative trends, often leading either to environmentally destructive activities or migration to urban centers.

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