

Article

Justifying Soil Protection and Sustainable Soil Management: Creation-Ethical, Legal and Economic Considerations

Bernd Hansjürgens ^{1,*}, Andreas Lienkamp ² and Stefan Möckel ³

¹ Department of Economics, Helmholtz Centre for Environmental Research—UFZ, Permoserstraße 15, 04315 Leipzig, Germany

² Institut für Katholische Theologie, University Osnabrück, Schloßstraße 4, 49074 Osnabrück, Germany; andreas.lienkamp@uni-osnabrueck.de

³ Department of Environmental Law, Helmholtz Centre for Environmental Research—UFZ, Permoserstraße 15, 04315 Leipzig, Germany; stefan.moeckel@ufz.de

* Correspondence: bernd.hansjuergens@ufz.de; Tel.: +49-341-235-1233

Received: 21 August 2018; Accepted: 17 October 2018; Published: 22 October 2018



Abstract: Fertile soils form an important basis for survival for humans, but also for animals, plants and ecosystems, on which all terrestrial organisms rely. Soil is not only of central importance to the global provision of food and in the fight against hunger; climate, biological diversity and water bodies are also highly dependent on soil quality. Soil conservation is therefore a decisive factor in the survival of humanity. Pope Francis also emphasized this in his encyclical “Laudato si’”. However, increasing pressure is being exerted on soils, which poses an enormous challenge to the international community and thus also to the church. Against this background, in this article, which is based on a Memorandum of the German Bishops’ Working Group on Ecological Issues, arguments and justifications for soil protection and sustainable soil management are developed from different angles—from a creation-ethical, a legal, and an economic perspective. All three perspectives point in the same direction, namely that in the use of soils public interests that serve the society and the environment should be given priority over private interests. These arguments may serve as an important reference point in political and societal debates about soils, and may support strategies for sustainable soil management.

Keywords: justifying soil protection; sustainable soil management; creation ethics; Laudato si’; property rights; German Constitutional Law

1. Introduction

Fertile soils form an important basis for survival for humans, but also for animals, plants and ecosystems and their services, on which all terrestrial organisms rely, for better or for worse [1]. Soil is not only of central importance to the global provision of food and in the fight against hunger; climate, biological diversity and water bodies are also highly dependent on soil quality [2] (p. 10), [3] (p. 397). Soil conservation is therefore a decisive factor in the survival of humanity. Pope Francis also emphasized this in his seminal encyclical “Laudato si’” ([4], the encyclical will be cited below using LS and the paragraph number). However, increasing pressure is being exerted on soils. Population growth, increasing urbanisation, and high requirements for food and energy are all associated with the degradation of soils in many regions of the world, destroying soil fertility that has arisen over thousands of years [5–8], [9] (p. 648). This all poses an enormous challenge to the international community and thus also to the church. Humankind is dealing with no less than a central element of creation and its contribution to life.

This article, which is based on the Memorandum “Der bedrohte Boden” (“The threatened soil”) [10] of the German Bishops’ Conference Working Group on Ecological Issues, deals with the necessity and justification of soil protection from a creation-ethical, legal, and economic perspective. Particular emphasis is placed on Pope Francis’ encyclical “Laudato si’”. All three lines of argument form a strong case for protecting soils through adequate policy strategies and measures. They underline that soil protection is indispensable for humankind in order to save the basis of our life. The presented arguments may serve as an important reference point in political and societal debates about soils, and may thus support strategies for sustainable soil management.

2. Justifying Soil Protection from Ethical, Legal, and Economic Perspectives

Soil conservation has long been a topic for normative reflection in virtually all human cultures and religions. As a prominent example, this can be shown on the Earth Charter, which sees itself as an inspiring vision of fundamental ethical principles for sustainable development, supported by religious and non-religious people from almost all cultures. The document underscores: “The resilience of the community of life and the well-being of humanity depend upon preserving a healthy biosphere with all its ecological systems, a rich variety of plants and animals, fertile soils, pure waters, and clean air. The global environment with its finite resources is a common concern of all peoples. The protection of Earth’s vitality, diversity, and beauty is a sacred trust.” [11]. Like other renewable resources the use of soil should therefore be managed in ways that do not exceed rates of regeneration and that protect the health of ecosystems. Main reasons are our responsibility to one another, to the greater community of life, and to future generations as well as the human rights, among these the rights to uncontaminated soil, to potable water and to food security (*ibid.*). In the following, our intention is not to unfold and reflect the entire ethical discussion about soils. Instead, the ethical and spiritual perspective on soil and soil conservation will be deepened through recent statements of the Magisterium of the Catholic Church.

2.1. Theological Considerations Relating to Creation

2.1.1. The Close Relationship between Humans and the Soil

In his environmental and social encyclical “Laudato si’”, Pope Francis underlines that we humans are “dust of the earth”. The human body is “made up of her elements” (LS 2). The Pope refers here to the second chapter of the Book of Genesis, which states that God created *adam*, the human, from *adama*, the dust from arable soil (Genesis 2:7). This is why humans are closely related to “our Sister, Mother Earth” (LS 1), as Francis states under reference to his patron saint, St. Francis of Assisi, and his “Canticle of the Creatures”. God loves “each of his creatures” (LS 92), so he also loves the Earth and her important constituent, soil, and he is therefore not indifferent to humans plundering, mistreating and ravaging the planet (LS 2). Such behaviour is “a crime against the natural world (. . .) is a sin against ourselves and a sin against God” (LS 8).

For this reason, the Biblical Laws on the prescribed rest periods—the Sabbath (rest on the seventh day), during the Sabbath or fallow year (no planting in the seventh year) and during the year of Jubilee (restoration of the original ownership after seven times seven years)—command regular care and relieving of pressure, not only for humans and animals, but also for soils, for the salvation of all created by God (Ex 20:8–11; 23:12; Lev 19:3.30; 25:4 f.8–31; Dtn 5:12–15): That “they may have rest” (Ex 23:12; LS 71; 237).

2.1.2. The Human Responsibility for the Earth

In the Bible, God is and remains the proprietor of his creation and thus also of the soil. For this reason, humans may work, plant and inhabit the land, but do not have the right to sell it. “The land is imprescriptible” [12] (p. 98). Only later, once the Israelites had mixed with the Assyrians in the North and with the Babylonians in the South and experienced the fact that land could also be bought

and sold, was the following edict issued, simultaneously opening up and restricting opportunity: “The land shall not be sold in perpetuity, for the land is mine; for you are strangers and sojourners with me” (Lev 25:23; Ex 9:29; LS 67). But not only the land, all of the earth and all that is within and on it, are governed by God’s sovereignty and jurisdiction (Ps 89:12; Dtn 10:14; [13] p. 1063): “The earth is the Lord’s”; to him belongs “the earth with all that is within it” (Ps 24:1; LS 67).

Over the course of the modern history of emancipation, during which science and technology sometimes distanced themselves greatly from the church and theology, the Biblical position was queried more and more, to the point where humans even took the place of God. The historically influential philosopher, René Descartes, no longer regarded God, but humans as the masters and owners of the natural world (LS 75).

Counter to this position, Christian churches and theologies still adhere to the concept that God is and remains the proprietor of what he has created (LS 67). For example, the Catholic Church in Luxembourg emphasizes in its social declaration that humanity is only afforded the status of a guest on this planet: “The Earth does not belong to us as we are guests” [14] (no. 4.7). The Earth has been loaned to us, as the German bishops already outlined in 1980: “The world is a gift given by God to humanity, a gift that is to be passed on to the next generation. (...) Creation thus becomes an inheritance, with each generation owing this inheritance to future generations, prohibited from consuming all and from creating an unbearable burden of mortgage. (...) The human responsibility for Creation is thus a responsibility to care for the inheritance and not to leave behind a desert in place of a garden” ([15], no. I.5; LS 159). The generations living at any point in time are thus only “stewards” (LS 116; 236).

The term *steward* in the Christian ecological ethics used today to describe the required human relationship to the non-human earthly creation, originally referred to a person who was given the responsibility by the owner of the land of managing (*oikonomia*) the important resources and functions of the *oikos*, the household. When extrapolated to God’s “household”, the “living house” Earth, this means that humans, in their position as stewards, are entrusted with responsible management [16], (pp. 920, 922). Jesus is the model authentic steward for Christians: Sensitive towards all that is living and the requirements of others. Authentic management of the household necessitates reverence and veneration in the sense of a deep respect for life (LS 207 with reference to the Earth Charter). A Christian understanding of stewardship requires belief in the presence of God in all life and all creation (LS 87 p. 233; 246) and results in respect for the natural world and life in harmony with nature [16] (p. 921).

However, according to some critics, especially Lynn Townsend White Jr. [17], the Holy Scripture—condensed in the so-called *dominium terrae*—had served for centuries purposes that legitimize an exploitative, destructive relationship to nature. In his article entitled “The Historical Roots of Our Environmental Crisis”, published in “Science”, White Jr. vehemently criticizes Christian anthropocentrism and the “Christian arrogance toward nature” (ibid., p. 1207). Christianity had not only established a dualism of humans and nature, but had also insisted that it was *God’s* will that humanity should exploit nature for its own purposes. Through its influence on science and technology, Christianity carried “a huge burden of guilt” (ibid., p. 1206). The state of the environment would continue to deteriorate if we do not overcome the Christian axiom, according to which nature has no other reason for existence than to serve man (ibid., p. 1207). Despite all legitimate objections to White’s essay, it should be positively emphasized that his critique was (and still is) partly justified and has set in motion a fruitful inner-church and inner-theological clarification process. It also helped to overcome the mere anthropocentric perspective on nature and fostered a more holistic perspective that also includes the value of nature in itself.

For example, it is now a consensus in biblical science that Luther’s influential translation and also the phrase “Macht euch die Erde untertan” (Subdue the Earth), which is based on it, are completely false. The original Hebrew text says, literally translated, “Set foot on the dry surface of the planet” (Gen 1:28). From antique representations, one knows that the gesture of foot-setting (hebr. *kābaš*) does not mean to trample down, but to protect something, here: the land. And “having dominion” (hebr.

rādāh), the other commonly misunderstood term (Gen 1:26.28), means in the context of the Bible a non-violent, caring guidance with wisdom and love—following the example of God, who reigns in love for his creation, and the good and just king, who should work for the well-being of the land and its inhabitants. Moreover, only these new translations, which are based on the original text, are compatible with the two divine assignments to the “first” genderless human being in Genesis 2 to serve (hebr. *ābad*) and preserve (hebr. *šāmar*) the Garden of Eden, the paradise, or in modern terms: the ecosystem (Gen 2:15). Who knows if the Christian exegesis, theology and ethics of the 1980s would have gained these important insights without the sharp criticism of White and others? However, even if the biblical belief in creation and the mandate for creation did not cause the exploitative attack on nature—“only the loss of the creation perspective made it possible in the end”—the church and theology would nevertheless have failed to object in good time and clearly to this misinterpretation and instrumentalization of the biblical texts [18] (p. 36). Unfortunately, recent German Bible translations, used in religious education and liturgy, have missed the opportunity to overcome the erroneous position of a (supposedly God-given) imperialist relationship of humankind to extra-human creation.

2.1.3. The Principle of Universal Dedication of the Goods of Creation

The position outlined here was laid down in the theological and ethical principle of universal dedication of the goods of the Earth. Pope Francis includes this in the Principles of Church Social Teaching. According to the Compendium of the Social Doctrine of the Church the principle confirms “both of God’s full and perennial lordship over every reality and of the requirement that the goods of creation remain ever destined to the development of the whole person and of all humanity” [19] (no. 177).

If we take the Biblical statements seriously, the legal human relationship with the Earth and other creatures on it can therefore not be determined by a proprietary relationship, and certainly not within the meaning of an *ius utendi et fruendi et abutendi*, i.e., the right to use something, to enjoy its fruits and to also be permitted to misuse it, that extends as far as the German Civil Code (BGB). In the first edition of the BGB, this right “to proceed at will and to exclude others from any influence whatsoever” has, however, already had a restriction imposed on it: What applied, and still applies, is “so long as this does not violate the Law or the rights of third parties” (§ 903 BGB).

In the first social encyclical “*Rerum novarum*”, published in 1891, Pope Leo XIII wrote “that the blessings of nature and the gifts of grace belong to the whole human race in common” (RN 25). For this reason—so Vaticanum II, under reference to Pius XII and John XXIII—the Earth must yield up all it contains to all humans and peoples in a fair manner—“under the leadership of justice and in the company of charity” (*Gaudium et spes* 69). According to Oswald von Nell-Breuning, the fact that the council “has issued the purpose (dedication) of the goods of the Earth to humanity and not to the individual humans” and that the “so often blurred distinction” between the entitlement to use for all and the concrete administration and management was “heavily emphasized” is to be greatly welcomed here [20] (p. 505). Shortly after the Council Pope Paul VI points out that the principle of the common use of goods governs all other rights—such as the rights to property and free trade (*Populorum progressio* 22). His successor John Paul II repeatedly referred to this principle in his social encyclicals, emphasizing its central role in underpinning the responsibility of humans when handling the goods of creation. He calls it the “first principle of the whole ethical and social order” (*Laborem exercens* 19.2) and the “characteristic principle of Christian social doctrine” (*Sollicitudo rei socialis* 42.5). The Christian tradition has never viewed the right to property as “absolute and untouchable”. Quite the contrary, it has always viewed it within the all-encompassing scope of the common rights of all to use the goods of creation overall; in other words, “the right to private property is subordinated to the right to common use, to the fact that goods are meant for everyone” (LE 14.2). So the right to private property carries a “social mortgage” (SRS 42.5), and we must amend this within the meaning of responsibility towards creation: also an *ecological* mortgage. Thomas Aquinas already justified private property only in a pragmatic manner and not based on Natural Law. His considerations emerge again

in modern economic ethics: “The institution of private property overall is essentially ethically justified by the incentive provided by exclusivity to use scarce resources sparingly and efficiently” [21] (p. 650). This means that property, which excludes others from use, will normally be utilized more carefully than commons that are jointly used. In the latter case—especially in the absence of social controls—there is the danger of individuals behaving as free riders, who do nothing towards maintenance of the common good and over-exploit the resource.

In his Message for the Celebration of the World Day of Peace in 2014, Pope Francis writes that humans are permitted to use the natural world, but must respect, preserve, nurture and manage it responsibly [22] (no. 9). However, the relationship between humans and nature is currently shaped more by greed and the arrogance of dominion, possession, manipulation and exploitation. In contrast, the economic utilization of the natural world should aim to serve our fellow humans, including the generations to come. Above all, it is a “truly pressing duty to use the earth’s resources in such a way that all may be free from hunger” (ibid.). The aim is that “all may benefit from the fruits of the earth, not only to avoid the widening gap between those who have more and those who must be content with the crumbs, but above all because it is a question of justice, equality and respect for every human being” (ibid.). In this context, Pope Francis reminds us of “that necessary *universal destination of all goods*” to ensure that all humans have “an effective and fair access to those essential and primary goods which every person needs and to which he or she has a right” (ibid.).

In “*Laudato si’*”, Pope Francis enters into greater depth on these thoughts and, once again, emphasizes the “principle of the subordination of private property to the universal destination of goods” (LS 93). Until this encyclical, the interpretation of the mentioned principle by the Church was predominantly anthropocentric. In this tradition, creation seems to exist only for the sake of man. Now the Pope harshly criticizes “a tyrannical anthropocentrism unconcerned for other creatures”; humans “are called to recognize that other living beings have a value of their own in God’s eyes” (LS 68). Humans have to ensure that the legitimate claims of animals are respected and protected (LS 68). In his address to the UN General Assembly on 25 September 2015, Francis furthermore stated “that a true ‘right of the environment’ does exist”. This right “must be forcefully affirmed, by working to protect the environment” [23]. In this context it must be mentioned that Pope Francis has a large opposition within the Catholic Church. Many Catholics, priests, bishops, cardinals and even theologians are not committed to his views on environmental sustainability. A recent survey of Catholic seminaries in the United States, Canada, Rome, and the Holy Land concluded that only eight colleges out of sixty-eight offered courses on faith and ecology. This illustrates how far many Catholic colleges are from meeting the aspiration of Francis in *Laudato si’* [24].

Just like the climate, the soil is “a common good, belonging to all and meant for all” (LS 23). However, how can it be *fairly* distributed? Laying down *equal* rights of use for all would probably be the easiest of all possible solutions. However, is this also fair? In addition to soil quality, do we not also need to account for prior exploitation, destruction and pollution, on which the majority of current global, highly unevenly distributed, wealth is based? Furthermore, justice demands that “things that are essentially the same must be treated in the same way and things that are essentially different must be treated different ways” [25] (no. 25). Humans are equal with regard to their dignity and rights, but they have different needs that are, among other factors, dependent on (sometimes variable) individual characteristics. Above all, however, these needs depend on natural, largely unchangeable environmental conditions that most people can usually only escape from with difficulty, if at all.

Determining the needs of *future* humans is even more difficult, especially if we consider generations that are chronologically far away from us. Even so, based on constants that are associated with being human, it is extremely unlikely that in the future people will have fundamentally different basic needs. Virtually certain they will also have a requirement for uncontaminated soil, clean drinking water and healthy food. This results in two main demands. First: Current problems related to the fairness of global distribution must be solved *now* and not accumulated and postponed to the detriment of future generations. Second: Assumptions and estimates relating to technological developments,

the available fertile soils and future consumption must be *realistic* and *not too optimistic* as subsequent generations may otherwise be placed at a disadvantage.

2.2. Economic and Legal Considerations

2.2.1. Exploitation of Soils—From Freedom to Responsibility

The problem of how soils can be protected and exploited more sustainably is also dependent on the question of to what extent ownership of land and soil can be regulated and its use limited. Land and soil use has varied greatly throughout the centuries. Within the history of economic thought there have been different strands of discussions ranging from explicit considerations of soils in early (classical) economic writings of Adam Smith, David Ricardo or Thomas Malthus, to a total neglect by (neoclassical) economics where the only sources of economic wealth are seen in labor and capital. “The history of the concept of land in economics shows an increasing narrow perception of the contribution of the natural world to human well-being. By the early 20th century interest in land was restricted to only those attributes that gave immediate economic value” [17], [26] (p. 6).

While in this article our intension is not to trace the entire economic discussion on soils, we specifically refer to property rights approaches. Property rights define the rights of particular actors to undertake actions towards clearly specified objects. In the soil context, the term property rights (also rights of use or control) makes clear that the proprietor of land holds all rights pertaining to the land and is (in an extreme case: fully) at liberty to make any kind of decision on how it is used: the proprietor can work and re-organize this property according to his personal ideas, can let it, sell it, create or prohibit access for others, etc. The peculiar aspect is that such a property rights approach can both explain soil regimes and give hints for the division of rights between landowners, soil managers, and society.

The relationship between humans and the natural world is essentially defined by how people live together in societies, through individual and social relationships, as well as by notions of acquisition and appropriation [27,28]. To clarify this, *Daniel W. Bromley* [29] (p. 21) refers to the “social construct of land”. Farming of the land by groups of people progressively disappeared with the demise of feudalism in Europe at the end of the Middle Ages and the rise of centralized states. Instead, private property developed in the form of fenced-off land [30] (pp. 198, 327, 450). Hardly any open fields, meadows or fallow areas remained. This development was accompanied by an increase in freedom and autonomy for the individual. In particular, in the British Empire, this led to a requirement for the definition and development of *property rights* in relation to land. This process of parallel development of individual rights of freedom and comprehensive, unrestricted rights of use of property was (at least for the wealthy) an important milestone in emancipation and release from the power of the central nobility and rulers and in securing personal rights to freedom. Comprehensive rights relating to the use of the resource, land, were therefore regarded as a building block in securing the rights to freedom. This led to whoever first worked the land taking possession of it in the colonies of Africa, the Americas, Australia and New Zealand, a process frequently involving violent displacement of the indigenous population [29] (p. 35).

Only since the 19th Century the use of the land has once again become associated with duties towards the public good [29] (pp. 23, 35). Proprietors of land are increasingly issued with obligations on how they are permitted to use the resource, soil. Environmental concerns play a growing role in this. The imposition of restrictions on land use is often associated with compensation payments from the state. Today, land use in many states lies somewhere between orientation towards property and social obligation, whereby the balance between these two categories is encountered and must be revisited repeatedly from a social perspective. In modern times, Bromley sees a rise in socialization and a decrease in private rights of control [29] (p. 36). However, this is only limitedly reflected in the current property rights. Particularly the ecosystem services approach can be used for re-defining property rights regimes. Bartkowski et al. have developed a frame, where these shortcomings can

be overcome by a re-definition of property rights, focussing particularly on social interests and the protection of soils [31]. This discussion is also well reflected in German Constitutional Law, which may serve as an example here to illustrate the division of property rights balancing between (full) private property and social responsibility from a legal perspective.

2.2.2. Social and Ecological Obligations Relating to Property under German Constitutional Law

Private property of soil and other objects is guaranteed by Article 14(1) of the German Basic Law (Grundgesetz—GG) within the catalogue of basic rights. According to current legal interpretation, basic libertarian and democratic order is essentially closely associated with this ruling, not only because there is a connection to the rights of freedom in the sense of proprietary law [32]—within the meaning of free and comprehensive power of disposition over assets—but also because it was recognized during engagement with socialism that private property formed the basis for careful and diligent handling of the property one was looking after—an insight that *Thomas Aquinas* had already formulated. The Basic Law emphasizes both the social obligation in relation to the property and the specificities relating to the possession of natural resources such as soils, as is made clear in Article 14(2) GG and Article 15 GG. According to Article 14(2) GG, property also carries obligations: “Its use should also serve the public good.” This is of particular relevance to the property of land and soil, as was noted by the German Federal Constitutional Court over 50 years ago: “The fact that land and soil is a non-renewable resource and is indispensable prohibits its use from being left fully in the hands of impenetrable free market forces and subject to the will of the individual; rather more, a just legal and social order requires the interests of the public in the soil to be emphasized in far greater measure than for other assets. Ownership of land cannot be simply put on an equal footing with the value of other assets, either economically or with regard to its social importance; it cannot be treated like mobile goods in legal dealings. Article 14(1) sentence 2 GG in association with Article 3 GG can therefore not be interpreted to mean that the legislator is under the obligation to subject all assets of monetary value to the same legal principles. Furthermore, no discrimination is made between financial capital and capital that is invested in agricultural and silvicultural property” [33] (p. 82).

The specificity relating to the ownership of land—and therefore also the soil on the land—that arises from the nature of the issue offers the possibility of greater legal regulation and, in particular, justifies far-reaching restrictions on the use and trade in land. Land is not only a non-renewable resource, but also remains an integral part of the environment, landscape, and ecosystems, even as private property. Land areas are shaped by their surroundings, just as they themselves, and how they are used, shape the environment. The German Federal Constitutional Court derives a particular responsibility of the owner and holder of the land and a specific duty of care from this situatedness and the embeddedness of land. “Pursuant to the consensual jurisdiction of the Federal Constitutional Court and the Federal Court of Justice, regulations that restrict the use of plots of land for reasons associated with the protection of Nature and the landscape do not, on principle, constitute expropriation within the meaning of Article 14(3) GG, but are provisions on substance and limits relating to the property within the meaning of Article 14(1) sentence 2 GG (. . .). This is based on the concept that each plot of land is shaped by its position and composition, as well as how it is integrated into its environment, i.e., through its given situation. This ‘situatedness’ may permit the legislator to impose restrictions on the proprietor’s authority, with the legislator laying down the substance and limits relating to the property pursuant to Article 14(1) sentence 2 GG, and hereby ensuring a balanced relationship between the private and social benefits of the use of the property (Article 14(2) GG) (. . .). This is because the stronger the social connection in relation to the proprietary object, the greater the proprietor’s freedom of use pursuant to Article 14(1) sentence 2 GG; the properties and function of the object are crucial to this process (. . .). When the natural circumstances or spatial landscape conditions of a plot of land are worthy of conservation in the interests of the general public and require protection, this results in a form of immanent restriction to the proprietorial authority, i.e., that is intrinsically linked to the

plot of land itself, which is simply reflected in the regulations on nature and landscape conservation legislation” [34].

The high level of obligation that is associated with owning land is underpinned and extended by the national target of conserving the environment, as laid down in Article 20a GG since 1994. This Article expressly raises conservation of the environment to a constitutional level and thus declares it a target for the public good that is of overriding importance and permits the limitation of basic rights and other targets for the public good. The article simultaneously includes guidelines for assessment and a decree on optimization and offers indicators for a general increase in the level of protection for environmental resources—thereby also for the land use and the soil protection. In *Czybulka's* [35] opinion, this allows the derivation of an “ecological obligation” for the property. Therefore, in Germany, under consideration of the principle of proportionality, it is constitutionally permissible to restrict the options for use of land that is owned for ecological reasons without awarding compensation. According to the Federal Constitutional Court, e.g., it does not constitute expropriation if the use of surface waters and groundwater bodies in private properties is also subject to a public management regime [36].

2.2.3. Internalizing External Effects: Strengthening the Polluter Pays Principle and Avoiding Disincentives

From an economic perspective, these legal arguments must still be expanded to include several aspects: Firstly, environmental and soil conservation is not just implemented for the natural world, for its own sake, i.e., for the plants, animals, communities and ecosystems, but equally, in the interests of humans: for their health and wellbeing, as well as their economic prosperity and, thus, ultimately due to “social concerns” within the meaning of Article 14(2) GG. The concept of ecosystem services, i.e. the services nature delivers to humans, clearly draws attention to this aspect. The natural world and the soil provide humans with numerous considerable services, as outlined above. These are not just visible benefits (such as traded on the markets), like food and feed, energy or drinking water, but also the hidden (as not traded on the markets) regulatory, cultural and supporting services, such as protection from flooding, purification of groundwater, recreation, habitat for numerous species, biodiversity, etc. [37] (p. 155), [38] (p. 456), [39] (p. 47).

Soil functions and services that cross the boundaries of plots of land underline the situatedness of land and soil and the resultant special responsibility borne by the holder and owner. From an economic perspective, pollution of the soils due to their activities constitutes a so-called negative external effect; uninvolved third parties are exposed to and harmed by these pollutants, without the perpetrator being held accountable. These “third parties” are not “faceless”: These are other people, future generations and the non-human natural world. Commercial gains from intensive cultivation that is associated with high levels of fertilizers and pesticides therefore contrast with the current and future overall costs to the economy, which are not, or insufficiently, considered in the perpetrators’ calculations. Pope Francis calls this problem a serious injustice (LS 36).

A second required endorsement arises from the polluter pays principle (LS 167). This involves charging the perpetrators of soil pollution for the damages they are causing, so that their behaviour is changed to ensure that all soil functions and soil ecosystem services are preserved within the meaning of a sustainable development (LS 195). On the one hand, the polluter pays principle is targeting aspects of fairness: Whoever exploits natural and soil resources gains specific advantages, so that it is only fair that the user of the resources and emitter of the pollutants abstains from exposing the general public to pollution, or at least keeps this to a minimum and pays compensation for any damages. However, the polluter pays principle also constitutes an efficiency standard: Namely, people who use the environment and are holders or owners of the land often have greater insights and opportunities to stop the associated pollution or over-exploitation of the environmental resources and to address the negative consequences than those who are being harmed or the general public [40]. This requires a *social* decision on whether the costs of the negative external effects must be borne by the perpetrators

alone or whether society should play a supporting role and, for example, grant the land user payments to contribute towards soil conservation. The (creation-)ethical and legal considerations touched upon above, but also the economic considerations that have been outlined, suggest a requirement for increasing the perpetrator's responsibility to ensure soil exploitation is oriented towards the common good. Of course, the application of the polluter pays principle is only possible if the polluter still exists and if he has the capacity to reduce the damages. The remediation of contaminated sites where contaminants were released in the past can often only be carried out by the general public.

3. The Responsibility of the Church

The responsibilities of the owners and holders of land and soil that have been described above from a theological, legal and economic perspective also apply to the churches, which belong to the largest non-state owners of land worldwide. Estimates assume that the Catholic Church owns over 716 m ha of land and soil world-wide [41]. Only a small portion of this is occupied by buildings such as churches, monasteries and other establishments. By far the majority is agricultural and silvicultural land that is either farmed by the church itself or leased to tenants. In Germany, the land assets of the Catholic Church are estimated at about 825,000 hectares [42] (p. 435), roughly two and a half percent of Germany. After the Nation (federal government, states and communes), the Catholic Church is thus the largest land owner in Germany.

Based on its own Christian values (LS 93, 216) and the demand issued by Pope Francis "Truly, much can be done!" (LS 180), the Catholic Church and its congregations have a social role model function in the ecologically sustainable use of its lands (LS 180, 200). The methods that allow the ecologically sustainable use of arable land, grassland and vineyards as well as forests are generally well-known. For arable land, the principles and methods of ecological farming are particularly well suited to the conservation of soils, water bodies and the remaining environment, including biodiversity [43] (p. 26), [44]. The yields are very often only slightly below those from conventionally farmed areas [45]. For many smallholdings in regions that are less intensively farmed, the insights from ecological farming may well even provide better protection for the harvests from annual variation and increase the yields [46] (p. 65).

Accordingly, the Catholic Church should either ecologically farm its agricultural and silvicultural land itself, or stipulate this type of farming practice in contracts for tenancies. In practice, this requirement is faced with difficulties. The proprietary structures in the Catholic Church are very heterogeneous not only worldwide, but also in the individual dioceses, monasteries and other religious orders and church establishments. The variety of independent legal entities makes uniform practice exceedingly difficult, even if the Vatican makes an order regarding this.

In Bavaria an association of monasteries and church institutions with ecologically managed agriculture and/or gardening shows a good practical example of how a sustainable management of church land can be reached [47]. In addition to a step-wise improvement in its own practices, the church should also dedicate itself comprehensively and with high levels of commitment to the problem of soil conservation and soil restoration and the associated required actions, given its responsibilities towards humans and the environment.

4. Final Remarks

More than ever, sustainable soil conservation requires (improved) social integration. Soil is not only part of God's creation, but also constitutes valuable "natural capital" from an economic perspective, that is worthy of protection. If this capital is used up, then the social proceeds in the form of ecosystem services will also disappear. The creation-ethical, economic and legal arguments that are presented in this article all point into the same direction, forming a strong case for soil protection and the sustainable use of soils. They also make clear that in the discussions about private appropriation of soils and the interests of the society a public balance must be found and that restrictions of private property of ground can be justified by the interests of public welfare, especially in the case of ecological reasons.

Author Contributions: The German Bishops’ Conference Memorandum “Der bedrohte Boden” (“The threatened soil”) was published in German language in September 2016. B.H. and A.L. are members of the German Bishops’ Working Group on Ecological Issues which prepared the Memorandum. S.M. was involved as additional author. B.H. conceptualized the article and wrote drafts of the introduction and the economic parts. A.L. wrote drafts of the creation-ethical parts, and S.M. contributed the legal aspects. The members of the German Bishops’ Conference Working Group on Ecological Issues commented on these drafts, improved content and language and finalized the Memorandum. This article is a shortened version of the Memorandum, particularly focusing on the reasoning of soil protection, where latest literature was added.

Funding: This research received no external funding.

Acknowledgments: Support of the Members and the Secretary of the German Bishops’ Conference Working Group on Ecological Issues is gratefully acknowledged. We also wish to thank three anonymous reviewers for their helpful comments.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Creamer, R.E.; Hannula, S.E.; Van Leeuwen, J.P.; Stone, D.; Rutgers, M.; Schmelz, R.M.; de Ruiter, P.C.; Hendriksen, N.B.; Bolger, T.; Bouffaud, M.L.; et al. Ecological network analysis reveals the inter-connection between soil biodiversity and ecosystem function as affected by land use across Europe. *Appl. Soil Ecol.* **2016**, *97*, 112–124. [CrossRef]
2. FAO. *Revised World Soil Charter*; FAO: Rome, Italy, 2015.
3. TEEB. *TEEB for Agriculture & Food: Scientific and Economic Foundations*; UN Environment: Geneva, Switzerland, 2018. Available online: http://teebweb.org/agrifood/wp-content/uploads/2018/06/Foundations_vJun26.pdf (accessed on 18 October 2018).
4. Francis. Encyclical Letter *Laudato si’* on Care for Our Common Home. Available online: http://w2.vatican.va/content/dam/francesco/pdf/encyclicals/documents/papa-francesco_20150524_encyclica-laudato-si_en.pdf (accessed on 18 October 2018).
5. Dietrich, J.P.; Schmitz, C.; Muller, C.; Fader, M.; Lotze-Campen, H.; Popp, A. Measuring agricultural land-use intensity—A global analysis using a model-assisted approach. *Ecol. Model.* **2012**, *232*, 109–118. [CrossRef]
6. Mauser, W.; Klepper, G.; Zabel, F.; Delzeit, R.; Hank, T.; Putzenlechner, B.; Calzadilla, A. Global biomass production potentials exceed expected future demand without the need for cropland expansion. *Nat. Commun.* **2015**, *6*, 8946. [CrossRef] [PubMed]
7. Popp, A.; Calvin, K.; Fujimori, S.; Havlik, P.; Humpenoder, F.; Stehfest, E.; Bodirsky, B.L.; Dietrich, J.P.; Doelmann, J.C.; Gusti, M.; et al. Land-use futures in the shared socio-economic pathways. *Glob. Environ. Chang.* **2017**, *42*, 331–345. [CrossRef]
8. Dewi, W.S.; Senge, M. Earthworm diversity and ecosystem services under threat. *Rev. Agric. Sci.* **2015**, *3*, 25–35. [CrossRef]
9. FAO-ITPS. *Status of the World’s Soil Resources. Main Report*; FAO: Rome, Italy, 2015.
10. Die deutschen Bischöfe: Kommission für gesellschaftliche und soziale Fragen. *Der bedrohte Boden: Ein Expertentext aus sozialer Perspektive zum Schutz des Bodens*; Sekretariat der Deutschen Bischofskonferenz: Bonn, Germany, 2016. Available online: https://www.dbk-shop.de/media/files_public/snvrwhtd/DBK_1244.pdf (accessed on 18 October 2018). (In German)
11. The Earth Charter. *A Declaration of Fundamental Principles for Building a Just, Sustainable, and Peaceful Global Society in the 21st Century*; The Earth Charter Initiative, International Secretariat: San José, Costa Rica, 2000.
12. Barros Souza, M.D.; Caravias, J.L. *Theologie der Erde*; Patmos: Düsseldorf, Germany, 1990. (In German)
13. Zenger, E. Die Psalmen. In *Stuttgarter Altes Testament*; Zenger, E., Ed.; Katholische Bibelanstalt: Stuttgart, Germany, 2004; pp. 1036–1219. (In German)
14. Erzdiözese Luxemburg. *Sozialwort der Katholischen Kirche in Luxemburg*; Archevêché: Luxembourg, 2007. (In German)
15. Die deutschen Bischöfe. *Zukunft der Schöpfung—Zukunft der Menschheit—Erklärung der Deutschen Bischofskonferenz zu Fragen der Umwelt und der Energieversorgung*; Sekretariat der Deutschen Bischofskonferenz: Bonn, Germany, 1980. (In German)
16. Coleman, G. Stewardship. In *The New Dictionary of Catholic Social Thought*; Dwyer, J.A., Ed.; The Liturgical Press: Collegeville, MN, USA, 1994; pp. 920–924.

17. White, L., Jr. The Historical Roots of Our Ecological Crisis. *Science* **1967**, *155*, 1203–1207. [[CrossRef](#)] [[PubMed](#)]
18. Kessler, H. *Das Stöhnen der Natur. Plädoyer für eine Schöpfungsspiritualität und Schöpfungsethik*; Patmos: Düsseldorf, Germany, 1990. (In German)
19. Pontifical Council for Justice and Peace. Compendium of the Social Doctrine of the Church. Available online: http://www.vatican.va/roman_curia/pontifical_councils/justpeace/documents/rc_pc_justpeace_doc_20060526_compendio-dott-soc_en.html (accessed on 18 October 2018).
20. Nell-Breuning, O.V. Kommentar zum III. Kapitel von Gaudium et spes. In *Lexikon für Theologie und Kirche. Ergänzungsband 3*; Herder: Freiburg, Germany, 1968; pp. 487–516. (In German)
21. Homann, K. Marktversagen. In *Lexikon der Wirtschaftsethik*; Herder: Freiburg, Germany; Basel, Switzerland; Wien, Austria, 1993; pp. 646–654. (In German)
22. Francis. Fraternity, the Foundation and Pathway to Peace. Message for the Celebration of the World Day of Peace. 2014. Available online: https://w2.vatican.va/content/francesco/en/messages/peace/documents/papa-francesco_20131208_messaggio-xlvi-giornata-mondiale-pace-2014.html (accessed on 18 October 2018).
23. Francis. *Address to the General Assembly of the United Nations Organization*; United Nations Headquarters: New York, NY, USA, 25 September 2015. Available online: http://w2.vatican.va/content/francesco/en/speeches/2015/september/documents/papa-francesco_20150925_onu-visita.html (accessed on 18 October 2018).
24. The Interfaith Center for Sustainable Development. *Report on Catholic Ecology Courses in Priestly Formation in the United States, Canada, Rome, and the Holy Land*, 2nd ed.; The Interfaith Center for Sustainable Development: Jerusalem, Israel, 2016.
25. Federal Constitutional Court. Zu den verfassungsrechtlichen Anforderungen an gesetzliche Begrenzungen der Maßgeblichkeit der handelsrechtlichen Grundsätze ordnungsmäßiger Buchführung für die steuerrechtliche Gewinnermittlung. Decision of the First Senate of 12 May 2009, case number 2 BvL 1/00. *Decis. Fed. Const. Court (BVerfGE)* **2009**, *141*, 1–56. (In German)
26. Hubacek, K.; van den Bergh, J.C.J.M. Changing concepts of ‘land’ in economic theory: From single to multi-disciplinary approaches. *Ecol. Econ.* **2018**, *56*, 5–27. [[CrossRef](#)]
27. Bromley, D.W. *Environment and Economy: Property Rights and Public Policy*; Princeton University Press: Princeton, NJ, USA, 1991.
28. Vatn, A. *Institutions and the Environment*; Edward Elgar: Cheltenham, UK, 2005.
29. Bromley, D.W. The Social Construction of Land. In *Institutioneller Wandel und Politische Ökonomie von Landwirtschaft und Agrarpolitik—Festschrift zum 65. Geburtstag von Günther Schmitt*; Hagedorn, K., Ed.; Campus Verlag: Frankfurt, Germany; New York, NY, USA, 1996; pp. 21–45.
30. Wesel, U. *Geschichte des Rechts in Europa. Von den Griechen bis zum Vertrag von Lissabon*; C.H. Beck: München, Germany, 2010; p. 734. (In German)
31. Bartkowski, B.; Hansjürgens, B.; Möckel, S.; Bartke, S. Institutional economics of agricultural soil ecosystem services. *Sustainability* **2018**, *10*, 2447. [[CrossRef](#)]
32. Huber, P.M. Umweltschutz als Ausprägung von Sozialgebundenheit. In *Das Grundrecht des Eigentums: Grundsätze und Aktuelle Probleme. Politische Studien Sonderheft 1/2000*; Hanns Seidel Stiftung, Ed.; Hanns Seidel Stiftung: Munich, Germany, 2000; pp. 45–62. (In German)
33. Federal Constitutional Court. Decision of the First Senate of 12 January 1967, case number 1 BvR 169/63. *Decis. Fed. Const. Court (BVerfGE)* **1967**, *21*, 73–87. (In German)
34. Federal Administrative Court. Judgement of the Seventh Senate of 24 June 1993, case number 7 C 26/92. *Decis. Fed. Adm. Court (BVerwGE)* **1993**, *94*, 1–16. (In German)
35. Czybulka, D. Naturschutz und Verfassungsrecht. *Potschefstroom Electron. Law J.* **1999**, *2*, 1–29.
36. Federal Constitutional Court. Decision of the First Senate of 15 July 1981, case number 1 BvL 77/78. *Decis. Fed. Adm. Court (BVerwGE)* **1981**, *58*, 300–353. (In German)
37. MEA. *Ecosystems and Human Well-Being: Synthesis*; Millenium Ecosystem Assessment: Washington, DC, USA, 2005; Available online: <http://www.millenniumassessment.org/documents/document.356.aspx.pdf> (accessed on 18 October 2018).
38. TEEB. *The Economics of Ecosystems and Biodiversity, Ecological and Economic Foundations*; Earthscan: London, UK, 2011.
39. Naturkapital Deutschland–TEEB DE. *Der Wert der Natur für Wirtschaft und Gesellschaft—Eine Einführung*; Naturkapital Deutschland–TEEB DE: München/Leipzig, Germany, 2012. (In German)

40. Hansjürgens, B. Das Verursacherprinzip als Effizienzregel. In *Effizienz im Umweltrecht—Grundsatzfragen Wirtschaftlicher Umweltnutzung aus Rechts-, Wirtschafts- und Sozialwissenschaftlicher Sicht*; Gawel, E., Ed.; Nomos: Baden-Baden, Germany, 2001; pp. 381–396. (In German)
41. Morrison, K. Wealth of Roman Catholic Church impossible to calculate. *National Post*. 8 March 2013. Available online: <https://nationalpost.com/news/wealth-of-roman-catholic-church-impossible-to-calculate> (accessed on 18 October 2018).
42. Frerk, C. *Finanzen und Vermögen der Kirchen in Deutschland*; Alibri-Verlag: Aschaffenburg, Germany, 2002. (In German)
43. FAO. *Voluntary Guidelines for Sustainable Soil Management*; FAO: Rome, Italy, 2017.
44. Möckel, S. ‘Best available techniques’ as a mandatory basic standard for more sustainable agricultural land use in Europe? *Land Use Policy* **2015**, *47*, 342–351. [[CrossRef](#)]
45. Ponisio, L.C.; M’Gonigle, L.K.; Mace, K.C.; Palomino, J.; de Valpine, P.; Kremen, C. Diversification practices reduce organic to conventional yield gap. *Proc. B R. Soc.* **2014**, *282*, 1396–1402. [[CrossRef](#)]
46. FAO. *The State of Food Insecurity in the World—Economic Growth is Necessary But not Sufficient to Accelerate Reduction of Hunger and Malnutrition*; FAO: Rome, Italy, 2012.
47. Arbeitsgemeinschaft “Ökologie auf Kirchengrund”. *Ökologie auf Kirchengrund*. Available online: <http://www.oekologie-auf-kirchengrund.de> (accessed on 18 October 2018). (In German)



© 2018 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).