Seeds and Genetic Information Analysed from a Religious Realm: Common Good, Justice, Dignity, Creativity, and Constraints

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Abstract

According to the Stockholm Resilience Centre, ecological boundaries are already crossed for six out of nine global processes. One of these – that is recently quantified – is "novel entities" resulting from humans who "modify the genetics of living organisms and otherwise intervene in evolutionary processes…" Highlighting novel entities, the article focuses primarily on ecological responsibility relating to plants for food, with references also to medicines & vaccines and marine genetic resources. The article identifies inspiration and guidance from religious social ethics – notably common good, justice and human dignity – and Christian notions on relating to nature, hubris, free will, diversity, and creativity. Theocentrism is introduced, viewed as more capable than ecocentrism of challenging anthropocentrism and power abuse resulting from modern science. This analysis is undertaken while affirming the importance of scientists' and others' creativity.

Keywords: Digital sequence information, genetic resources, novel entities, patent rights, planetary boundaries

Planetary boundaries, religious social ethics, and human conduct framed by Christianity

The planetary boundaries concept was launched in 2009 by the Stockholm Resilience Centre. For six – climate change, novel entities, nitrogen & phosphorus, freshwater, land systems, and genetic diversity & the biosphere's functional integrity – planetary boundaries are transgressed; the third assessment in 2023 measured novel entities for the first time.[1]

Novel entities result from humans who "modify the genetics of living organisms, and otherwise intervene in evolutionary processes…"[2] Such modification can enhance food production – by a narrow range of food plants – and reduce genetic diversity. This will be elaborated below.

I identify three common elements in major religions' social ethics: Common good, justice and human dignity; the latter is not universal, cf. doctrinal teachings on gender roles and the caste system within Hinduism. There are important implications of highlighting religions' social ethics, supplemented by theocentrism.[3] First, compared to individual ethics, social ethics is *less* polarising and divisive.[4] Second, theocentrism goes *beyond* adherence to religious dogmas and authorities, and can be relevant in secularised contexts.[5] Third, individuals' *meaning-making* by relating to religion is more complex than what can be captured by adherence to religious dogma and authorities.[6] Fourth, individuals' *conduct* is more complex than what can be captured by adherence to dogma and church authorities.

To be able to illustrate my main points on human conduct I turn to Christianity. First, on *relating to nature*, several theologies can be found in the Bible: (i) dominion (Genesis 1: "rule over"); (ii) stewardship (Genesis 2: "work the ground"); and (iii) nature-inclusive (Mark 16:15: "all creation"). Moreover, Jesus's parables apply nature (ecology) or how wealth is managed (economy) as starting points; giving his disciples a mandate for the "ecumenical" (oikoumene; the whole inhabited world).

1 Stockholm Resilience Centre, "Planetary boundaries," 2025. Last accessed May 12, 2025. https://www.stockholmresilience.org/research/planetary-boundaries.html.

2 Stockholm Resilience Centre, "Planetary boundaries."

3 For a definition of theocentrism – "how a "higher authority" – God, loves the whole of creation and holds persons and institutions to account for the exercise of their power," see Hans Morten Haugen, "Plant Varieties for Food: Any Guidance from Christian Teaching?" *Ecothee* (under review).

4 Peter Egge Langsæther, "Religious voting and moral traditionalism: The moderating role of party characteristics," *Electoral Studies: an international journal on voting and electoral systems and strategy* 62:102095 (2019):1-8.

5 Jan-Olav Henriksen and Pål Repstad, *God after the Church Lost Control: Sociological Analysis and Critical-Constructive Theology* (Routledge, 2022).

6 Christian Smith, *Religion: What it is, How it Works, and Why it Matters* (Princeton University Press, 2017), 25, seeing religions as "culturally prescribed practices," defined as "culturally meaningful behaviors that are intentionally repeated over time." Meaning-making obviously also happens in an individualised context.

Second, the Bible has several stories warning about *hubris* or excessive self-confidence: the Fall in Genesis 3; wickedness in Genesis 4 & 6; Babel Tower in Genesis 11. Third, among the first Christians one saw an emergence of the unique status of the individual,[7] having one's conscience embedded beyond human authorities and hierarchies. Moreover, human *free will* can explain why hierarchies and oppression prevailed; persons with status and positions to defend tend to justify and maintain these. Fourth, Christianity's global expansion happened parallel to and allied with political and economic territorial expansion, while also adapting to local customs, leading to *diversity*. Fifth, human *creativity*, whether this is seen as inspired by transcendental forces, like the Holy Spirit – cf. Isa 44:3 & John 3:8 – or developments of the human brain, is positively acknowledged. These five – relating to nature, hubris, free will, diversity, creativity – capture human conduct. These are most distinctly Christian but can be found in other religions and among those with no religious faith.

To these can be added metaphysical aspects, encompassing mysteries of life's origin and what explains our planet's unique biochemical, gravitational, and atmospheric balances.[8] A survey on scientists and religion concludes:[9]

> atheist scientists, especially in Western countries, described having a science-consistent spirituality, finding feelings like awe, wonder, purpose, and meaning in their scientific work. Atheist scientists do not necessarily see science and religion as inherently in conflict.

This indicates a potential for insights from a religious realm to play a role in a secular realm. I sincerely believe that theocentrism is an underutilised resource for guiding human conduct and holding those with power to account for their use of power. While not disregarding ecocentrism, theocentrism has arguably a stronger potential than ecocentrism to guide human conduct.

The article's research question is: *Reflecting recent global regulation of genetic resources and genetic information, and slow progress on recognition of traditional knowledge on genetic resources, can religious teaching on nature and science give guidance?*

7 Larry Siedentop, *Inventing the Individual: The Origins of Western Liberalism* (Harvard University Press, 2014).

8 Ian Barbour, *When Science Meets Religion* (Harper, 2000), 39-40.

9 Elaine Ecklund et al., *Secularity and Science: What Scientists around the World Really Think about Religion* (Oxford University Press, 2019), 199.

Two terms must be clarified. First, digital sequence information (DSI), a term appearing for the first time in a 2016 decision by the Conference of the Parties to the Convention on Biological Diversity (CBD-COP).[10] Second, genetic resources – defined in Article 2 of CBD as "material"; hence *not* including DSI – that can be subject to intellectual property rights (IPRs), provided that the requirements for time-limited protection are met. CBD Article 16 specifies reconciliation between the CBD and IPRs.

The CBD's three objectives are conservation, sustainable use, and "the fair and equitable sharing of the benefits arising out of the utilization of genetic resources." Article 15(7) specifies that such benefits are to be shared "with the Contracting Party providing such resources." One CBD provision, Article 8(j), specifies the sharing of benefits with indigenous and local communities. Subsequently, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (adopted in 2011, entered into force 2014) strengthens this sharing with indigenous peoples.

The chapter proceeds as follows. Part two introduces a dichotomy, as framed by Vandana Shiva. The choice of a scholar from a Hindu tradition is justified by a quote: "In Asia, nature was not as actively stripped of its life and mystery as had been so characteristically the case in the West."[11] Moreover, Ian Barbour's four relationships between science and religion are introduced. Part three identifies the core of DSI. Part four analyses-recent recognition of traditional knowledge. Part five discusses religious teaching's possible guidance in comprehending and assessing the power that comes with modern science. Part six concludes.

Two cultures of science

Vandana Shiva (b. 1952) has warned against the power of corporations involved in transgenic food production; transgenic implies that a gene from one organism is inserted into another organism; and the resulting characteristics are kept for the offspring of this organism. Corporations and their support systems involved in transgenic production are termed "the life science industry". Shiva asserts: "The conflict … is between two

10 CBD-CoP, Decision XIII/16. Digital sequence information on genetic resources, CBD/COP/DEC/13/16, 2016. See also CDB-SBSTTA [Subsidiary Body on Scientific, Technical and Technological Advice], Decision XX/8. Synthetic biology, UNEP/CBD/SBSTTA/REC/XX/8, 2016; DSI is referred to in bracketed paragraphs.

11 Mikael Hård and Andrew Jamison, *Hubris and Hybrids: A Cultural History of Technology and Science* (Routledge, 2005), 127.

cultures of science: one based on transparency, public accountability and responsibility toward the environment and people and another based on profits and the lack of transparency, accountability and responsibility."[12]

More recently, at a seminar in the European Parliament (2017), Shiva held:[13]

> The rise of masculinist science with Descartes, Newton, Bacon led to the domination of reductionist mechanistic science and a subjugation of knowledge systems based on interconnections and relationships. This includes all indigenous knowledge systems, and women's knowledge.

The term is "knowledge system"; in 2000, Shiva applied the term "science". These – and "technology" – are defined by the UN Committee on Economic, Social and Cultural Rights.[14]

Based on a Food and Agricultural Organization (FAO) review of 250 studies, indigenous peoples are found to be the best stewards of their local forests and nature; and their management of local resources will significantly reduce carbon emissions.[15]

A final theory is Ian Barbour's (1923-2013) outline of four models on the relationship between science and religion: conflict, independence, dialogue, and integration.[16]

Global asymmetries, cf. the emphasis in the research question on regulation of genetic resources and genetic information, and slow progress on recognition of traditional knowledge, are an integral part of Shiva's theories; these asymmetries are not outlined by Barbour.

Digital sequence information

The "recent global regulation of … genetic information" element of the research question will be analysed. DSI is derived from plant genetic resources, aquatic resources or as the genetic code of pathogens. A pathogen is an infectious microorganism or agent. A virus – being genetic material "hosted" by a protein, not a cell – acts like a pathogen. Bacteria can act

12 Vandana Shiva, *Stolen Harvest: The Hijacking of the Global Food Supply* (Zed Books/Pluto, 2000), 109.

13 Vandana Shiva, "Women's Economic Empowerment: Let's Act Together," March 8, 2017, 9.

14 UN Committee on Economic, Social and Cultural Rights, E/C.12/GC/25, General comment No. 25 on science and economic, social, and cultural rights, 2020, paragraphs 4, 5, 7.

15 FAO, "Forest Governance by Indigenous and Tribal peoples. An Opportunity for Climate Action in Latin America and the Caribbean, Policy Brief," 2021. FAO is a UN specialized agency.

16 Barbour, *When Science*, 57-59, 150-180.

like a pathogen, as it can store and transfer genetic material. Information about the characteristics of a pathogen enables development of vaccines and medicines. In brief, DSI are genetic data, and CBD definitions refer to genetic *material*, not genetic *data*.[17]

While there are other terms, like "digital biological data", "genetic sequence data" (GSD), and similar terms,[18] international instruments apply the term DSI, being stored in more than "1,700 databases and repositories of biological data and associated information…"[19] CGIAR (Consultative Group in International Agricultural Research) specifies that DSI can contribute to the three CBD objectives, and "…CGIAR genebanks use DSI to assess the genetic diversity of collections and to help identify materials that are well-adapted to different conditions."[20] On public availability for general use, the requirements on those operating databases are demanding.[21] There are, however, inadequate procedures in several such databases.[22]

Benefit-sharing from utilisation of DSI will be done through a multilateral mechanism (MLM) and a global fund: the Cali Fund.[23]

Both CDB-CoP's 2024 decision and the Kunming-Montreal Global Biodiversity Framework (GBF; "Nature Agreement"), refers to DSI and "traditional knowledge associated with genetic resources…" in the same sentences.[24] Hence, a DSI might have its characteristics based on the application of traditional knowledge.

Turning to the 2001 International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA, entered into force 2004), its

17 D. Smith *et al.*, "The role of digital sequence information in the conservation and sustainable use of genetic resources for food and agriculture: opportunities and challenges. Background Study Paper, No. 73," Commission on Genetic Resources for Food and Agriculture (CGRFA), FAO, 2022 analyzes DSI. For a list of DSI methods, see FAO CGRFA, CGRFA/WG-AqGR-4/23/7/Inf.1, 2023, 12-14.

18 Rachel Wynberg *et al.*, "Farmers' Rights and Digital Sequence Information: Crisis or Opportunity to Reclaim Stewardship Over Agrobiodiversity?" *Frontiers in Plant Science* 2021, 2, n1.

19 Elizabeth Karger *et al.*, "Digital Sequence Information on Genetic Resources (DSI): An Introductory Guide for African Policymakers and Stakeholders," 2019, 5, accessed November 12, 2025. https://archive.abs-biotrade.info/fileadmin/media/Knowledge_Center/Pulications/DSI/Introductory_Guide_-_DSI_-_ABS_Initiative_-_201908.pdf. See also Fabian Rohden et al., "Combined study on DSI in public and private databases and DSI traceability. As requested by decision 14/20 (paragraph 11 (c) to (d)) from the fourteenth Conference of the Parties to the Convention on Biological Diversity," 2020.

20 CGIAR, "Digital Sequence Information (DSI) and plant genetic resources," effective December 3, 2024, https://www.cgiar.org/news-events/news/dsi-and-plant-genetic-resources. Cf. also Amber Hartmann Scholz and 39 others, "Multilateral benefit-sharing from digital sequence information will support both science and biodiversity conservation," *Nature Communications* 13:1086 (2022): 1-5.

21 CBD-CoP Decision XVI/2, Annex, paragraph 10.

22 Mathieu Rouard and colleagues, "Genetic databases in the era of 'DSI' benefit-sharing," *Trends in Genetics* 41 no. 6 (2025): 451–455.

23 CBD Secretariat "The Cali Fund Launch," February 24, 2025. https://www.cbd.int/article/cali-fund-launch-2025; operationalizing CBD-CoP, Decision XVI/2, Digital sequence information on genetic resources, CBD/COP/DEC/16/2, Annex, 2024.

24 CBD-CoP Decision XVI/2, Annex, paragraph 10(c); CBD-CoP, Decision XV/4, Kunming-Montreal Global Biodiversity Framework, CBD/COP/DEC/15/4, 2022b, 8 (Goal C) and 11 (target 13). The four GBF goals are to be met by 2050; most of the targets are to be met by 2030.

Governing Body (GB) has also addressed DSI-related policies. In 2015 it directed the Open-ended Working Group to Enhance the Functioning of the Multilateral System of Access and Benefit-sharing: "To consider the issues regarding genetic information associated with the material accessed from the Multilateral System."[25] When a more specific mandate was given in 2022, DSI/GSD was identified among "key issues".[26]

Moreover, DSI derived from aquatic genetic resources is recognised in several provisions of the Agreement under the 2023 United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ; entered into force 2026). It refers to DSI 29 times in its Part II titled Marine genetic resources (Articles 9-16), including the fair and equitable sharing of benefits. FAO CGRFA (Commission on Genetic Resources for Food and Agriculture) has analysed DSI in the context of aquatic genetic resources.[27]

The World Health Organization (WHO, a UN specialized agency) and pharmaceutical companies address DSI. The 64th World Health Assembly adopted the Pandemic Influenza Preparedness (PIP) Framework for the sharing of influenza viruses and access to vaccines and other benefits.[28] Three WHO employees have analysed how the PIP Framework might inspire other access and benefit sharing regimes.[29]

In 2017, the WHO Secretariat informed the Secretary of the CBD on the importance of DSI for a rapid "identification and detailed characterization of pathogens";[30] and "research, leading to a better understanding of diseases."[31]

Having great interest in DSI, Wellcome Trust and Wellcome Trust Sanger Institute:[32]

25 ITPGRFA-GB, Resolution 1/2015. Measures to Enhance the Functioning of the Multilateral System of Access and Benefit-sharing, IT/GB-6/15/Res1, 2015, 2.

26 ITPGRFA-GB, Resolution 3/2022. Measures to Enhance the Functioning of the Multilateral System of Access and Benefit-sharing, 2022, 2.

27 FAO CGRFA, CGRFA/WG-AqGR-4/23/7/Inf.1, 2023.

28 WHA Sixty-fourth World Health Assembly. Geneva, 16–24 May 2011. Resolutions and decisions, annexes, Annex 2, 2011.

29 Anne Huvos *et al.*, "The Pandemic Influenza Preparedness Framework as an Access and Benefit Sharing Mechanism," in *Viral Sovereignty and Technology Transfer. The Changing Global System for Sharing Pathogens for Public Health Research*, ed. Sam F. Halabi and Rebecca Katz(Cambridge University Press, 2020).

30 WHO Secretariat, "Comments by the World Health Organization on the Draft Fact-Finding and Scoping Study "The Emergence and Growth of Digital Sequence Information in Research and Development: Implications for The Conservation and Sustainable Use of Biodiversity, and Fair and Equitable Benefit Sharing," Dated 9 November 2017, 1-2.

31 WHO Secretariat, "Comments", 2.

32 Wellcome Trust and Wellcome Trust Sanger Institute, "Convention on Biological Diversity – Call for information: The use of digital sequence information on genetic resources" last modified September 8, 2017, https://www.cbd.int/abs/DSI-views/WellcomeSanger-DSI.pdf.

> strongly disagree with the proposal to include [DSI] in the scope of the [CBD] and the Nagoya Protocol. We agree fully that countries should share equitably in the benefits of research and development activities to which they contribute and which utilise sovereign genetic resources, but consider that the inclusion of DSI would fail to achieve this goal, and do far more harm than good.

We see that there is only an acknowledgement of sharing with "countries"; not reflecting the stronger emphasis on indigenous and local communities in the 2011 Nagoya Protocol. Too restricted access to DSI, being a barrier to research collaborations, is a legitimate concern.[33]

Finally, DSI is included – initially on a general level – in the *first* WHO treaty on scientific collaboration: the WHO Pandemic Agreement.[34] Its Article 12 is titled Pathogen Access and Benefit-Sharing System (PABS). As specified in Article 12(2) a so-called PABS Instrument will be negotiated and annexed to the WHO Pandemic Agreement; it will include provisions on PABS "materials and sequence information." It was originally expected that these PABS negotiations would result in an adoption at the 2026 World Health Assembly, enabling the WHO Pandemic Agreement to be ratified by states. However, due to disagreements between Western states and states in the Global South on access to pathogen sequence information and vaccines, reflecting global tensions seen in other regimes, agreement was not reached.

The 79th World Health Assembly in May 2026, agenda item 13.3, decided to extend the mandate of the Open-ended Intergovernmental Working Group on the WHO Pandemic Agreement. To illustrate how the hantavirus and the Ebola Bundibugyo virus (EBV) were subject to researchers' different approaches as regards public access to data base for genetic sequences, see Suerie Moon et al., "Despite Delays, Negotiations Over Critical PABS Annex to WHO Pandemic Treaty Reveal Signs of Progress; Here's Why," Health Policy Watch, June 17, 2026. https://healthpolicy-watch.news/despite-delays-negotiations-over-critical-pabs-annex-to-who-pandemic-treaty-reveal-signs-of-progress-heres-why/ [links to all issues of Governing Pandemics Snapshot].

33 Fabian Rohden and Amber Hartmann Scholz, "The international political process around Digital Sequence Information under the Convention on Biological Diversity and the 2018–2020 intersessional period," *Plants, People, Planet* 4, no. 1 (2022): 51-60.

34 WHA, "WHO Pandemic Agreement," Effective May 20, 2025. https://apps.who.int/gb/ebwha/pdf_files/WHA78/A78_R1-en.pdf.

The emphasis on sharing and access to resources – emphasised in international treaties on genetic resources and genetic information; intended to also apply to pathogens – is essentially in line with Christian teaching.

Increased recognition of traditional and indigenous knowledge; inadequate implementation

Turning to the research question's "slow progress on recognition of traditional knowledge on genetic resources"[35] it is relevant to note that the term "indigenous innovation"[36] has been proposed. Recent international treaties, particularly the BBNJ, include numerous provisions on traditional knowledge, but the WHO Pandemic Agreement has no references to traditional knowledge. Indigenous peoples are only included in the context of "social participation" within the whole-of-society approach in Article 15.

In short, BBNJ has a *conservation of nature* approach to traditional knowledge. Hence, indigenous peoples – not only present in forests and deserts – and local communities are considered as knowledge holders, providing crucial insights. Traditional knowledge is to be *respected* and applied; not *protected* by an IPR-like system.

After 16 years of negotiations, a body under the World Intellectual Property Organization (WIPO, a UN specialized agency) has not succeeded in agreeing on a treaty on the "positive" protection of traditional knowledge.[37] A 2024 Treaty on Intellectual Property, Genetic Resources and Associated Traditional Knowledge[38] (GRATK Treaty) provides "defensive" protection, by requiring patent applicants to disclose which "Indigenous Peoples or local community, as applicable, who provided the traditional knowledge associated with genetic resources."[39]

35 See also Hans Morten Haugen, "Traditional Knowledge and IP: Defeating Novelty Claims, Enabling Positive Protection, Promoting Nature Conservation, or Filling a Human Rights Gap?" in *A Research Agenda for IP and Environmental Sustainability*, ed. Taina Pihlajarinne (Edward Elgar, 2026).

36 Peter Drahos and Susy Frankel, *Indigenous Peoples' Innovation: Intellectual Property Pathways to Development* (ANU Press, 2012).

37 WIPO General Assembly, "List of Decisions - 2025", 9-11, Effective September 25, 2025. https://www.wipo.int/documents/d/assemblies/docs-en-a66-2025-list-decisions.pdf. The earliest references to positive – and defensive – protection are found in WIPO Secretariat, WIPO/GRTKF/IC/4/8, Elements of a Sui Generis System for the Protection of Traditional Knowledge, 2002, paragraphs 14, 47, and 48. For the last version of a possible international instrument on protection of traditional knowledge, see WIPO Secretariat, WIPO/GRTKF/IC/52/4, The Protection of Traditional Knowledge: Draft Articles, 2025.

38 WIPO General Assembly, GRATK/DC/7, Treaty on Intellectual Property, Genetic Resources and Associated Traditional Knowledge, effective May 24, 2024; after 22 months (March 2026), it still has only three ratifications: Albania, Malawi, Uganda.

39 WIPO General Assembly, GRATK Treaty, Article 3(2)(a); see also Article 3(3) on a declaration by the patent applicant.

There is *one* regional binding instrument with a positive protection approach to traditional knowledge, in force since 2015.[40] South Africa is not among its parties but has a comprehensive national legislation.[41] All *other* states hosting the San people are parties to the Swakopmund Protocol, whose provisions and implementation mechanisms are weak.

However, despite increased *formal* recognition in treaties,[42] in *most* countries, commercial actors' utilization of indigenous peoples' and local communities' traditional knowledge relating to genetic resources, can be done *without* an explicit consent and/or any agreement on benefit-sharing. Norway is an exception: Its Patent Act Section 8b specifies a disclosure requirement, referring to the false statement provision in Norway's Penal Code.

The term "benefit-sharing" can in accordance with ITPGRFA Article 13(2) include information, technology, capacity-building, and monetary or other benefits. A Benefit-sharing Fund under the ITPGRFA has not lived up to the initial expectations on monetary benefit-sharing,[43] but more than 100 projects are funded.[44]

In the Annex to the Nagoya Protocol, "other benefits" is specified as: "Joint ownership of relevant intellectual property rights." Such agreements have been entered into for other IPR categories than those studied in this article, namely geographical indications (GI).[45] EU has adopted a Regulation to implement the Nagoya Protocol.[46] This regulation does not specify joint IPR ownership as an option, only recognition of traditional knowledge.

Summing up, so-called life science companies, and commercial breeders are reaping the benefits of traditional knowledge, indicating weak standing of "common good." Most communities and farmers have no

40 ARIPO, Swakopmund Protocol on the Protection of Traditional Knowledge and Expressions of Folklore, 2010. Last accessed May 12, 2026. https://www.aripo.org/storage/resources-protocols/1674640255_phpJRYyDj.pdf.

41 South Africa, Protection, Promotion, Development and Management of Indigenous Knowledge Act. South African Act No. 6 of 2019, effective August 19, 2019. Via https://www.gov.za/documents/acts/protection-promotion-development-and-management-indigenous-knowledge-act-6-2019.

42 ITPGRFA specifies protection of traditional knowledge in Article 9(2), 'subject to national law' and 'as appropriate'. Hence, there is no obligation to legislate to implement these elements of farmers' rights.

43 ITPGRFA-GB, Resolution 3/2009. Implementation of the Funding Strategy of the Treaty (IT/GB-3/09/Report, p. 32-37), paragraph 4.

44 ITPGRFA Secretariat, About the Benefit-sharing Fund, accessed November 12, 2025. https://www.fao.org/plant-treaty/areas-of-work/benefit-sharing-fund/fifth-cycle/en.

45 Camille Meyer and Kiruben Naicker, "Collective intellectual property of Indigenous peoples and local communities: Exploring power asymmetries in the rooibos geographical indication and industry-wide benefit-sharing agreement," *Research Policy* 52:104851 (2023): 1-12; Hans Morten Haugen, "Intellectual Property Rights and Food Sustainability," in *Research Handbook on International and EU Law on Food Sustainability*, ed.Laura Pineschi, Elena Carpanelli and Marco Inglese (Routledge, forthcoming).

46 EU, Regulation 511/2014 of the European Parliament and of the Council of 16 April 2014 on compliance measures for users from the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization in the Union, paragraphs 1-4, 7, and 13.

benefit-sharing, indicating weak standing of global justice. Despite widely acknowledged religious teaching on nature and science, most notably Pope Francis' *Laudato si'*,[47] the clear advice on maintenance of farming communities and on promoting science led by other concerns than profit is not taken adequately seriously.

Guidance from religious teaching: accountability of and constraints on power abuse

The last element of the research question, on "can religious teaching on nature and science give guidance" will now be analysed. Christian teaching is analysed elsewhere.[48]

Four steps are identified by Stillwater in an "exegetical process"[49]: mere observations (measurements); via revelation (metaphor) and insight (meaning); to theology (metaphysics). His examples are embedded in laws of physics, chemistry or biology: (i) gravity; (ii) evolution; (iii) water; and (iv) complementarity. The last step introduces "Source"; this Source – God for Christians, Jews and Muslims – has a clear intention within the four listed examples: (i) interbeing; (ii) creativity, diversity, and variation; (iii) cyclical economies; and (iv) content (being) and process (becoming). By placing theology/metaphysics as the last step, Stillwater is theocentric. Applying Barbour's four models on Stillwater, the exegetical process of Stillwater seeks to *integrate* religion and environment.

One of the strongest critics of modern, male and western-dominated technology is the Indian and Hindu eco-feminist Vandana Shiva, who framed the two cultures of science. Her emphasis is on the life science industry, being "reductionist",[50] having a weak "responsibility toward the environment and people…"[51] Shiva, however, does not explicitly integrate religion and environment.

47 Pope Francis, "Encyclical Letter Laudato si' of the Holy Father Francis on Care for our Common Home." May 24, 2015, paragraphs 129-132; on respect for indigenous peoples, see paragraph 146.

48 For recent clarifications primarily by Pope Francis, see Hans Morten Haugen, "Plant Varieties for Food: Any Guidance from Christian Teaching?" *Ecothe* (under review); for confessional global church bodies' decisions over the last decades, see Tom Sverre Bredal-Tomren and Hans Morten Haugen, "Ecotheology in different denominations – A comparative review of 50 years of environmental statements from global summits and leaders," in *An Anthology of Contemporary Ecotheology, Philosophy and Eco-justice Practices: Ecothee Volume 7*, ed.Nadja Furlan Štante, Louk A. Andrianos and Tom Sverre Tomren (Annales ZRS, 2024). Integration – in Barbour's model – characterises these decisions.

49 J. D. Stillwater, "Nature's Scripture: The Interfaith Promise of Science," Zygon: *Journal of Religion and Science* 59, no. 4 (2024): 1057–69, 1063.

50 Shiva "Women's", 9.

51 Shiva, *Stolen Harvest*, 109.

Among the three – Stillwater, Barbour and Shiva – only Shiva has a notion of "public accountability."[52] The state must balance the interests of the communities and the life science industry by regulating accordingly. If either the law or the implementation mechanisms are too weak, industry actors will exploit this. However, the claim by Shiva that life science corporations operate with a "lack of … responsibility"[53] can be nuanced. Regulation of life science companies is much more detailed than regulation of information technology companies.

Even if this article has not introduced theories on the state, and on civil society, it is obvious that both can act in manners that serves as constraints on corporations' power abuse. In most countries, the majority religion has a prominent place in the civil society, and its norms can influence laws and the conduct of public institutions. In this context, one element of the definition of theocentrism – "holds persons and institutions to account for the exercise of their power"[54] – is important. Hence, a theocentrism that is focused on the common good and justice, as well as human dignity, can guide "secular" institutional conduct in the realm of nature and science.

Conclusion

From an ecocentric view, human expansion and control have most negative consequences. While theocentrism is still not widely discussed globally, I have argued that even in secularised contexts, theocentrism has an underutilised potential. Faced with the prevailing anthropocentric premises for decision-making, this article has found three insights or awarenesses that have an underutilised potential to guide decision-making: (i) humanity's relationship with – and dependence upon – nature; (ii) indigenous peoples and local communities' traditional knowledge; and (iii) the role of theocentric approaches – particularly on accountability for power abuse – in secular realms; guided by the common good, justice, dignity and God's love for Creation.

52 Shiva, *Stolen Harvest*, 109.
53 Shiva, *Stolen Harvest*, 109.
54 Haugen, "Plant Varieties."

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