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## SUSTAINABLE AGRICULTURE AND CLIMATE CRISIS: RELATIONAL ANALYSIS IN THE 2030 AGENDA AND THE UNFCCC

Pedro Sampaio Minassa  

Guilherme Weiss Niedermayer  

Luciana Turatti  

**Contextualization:** Touted as one of the answers to the climate crisis, sustainable development raises many questions, such as the vagueness between its theoretical definition and its implementation in the real world. Consequently, it extends its inconsistencies to everything that operates within its logic, as can be seen in "sustainable agriculture", for which the pressure is to produce more and more while emitting fewer gases that contribute to the worsening of the greenhouse effect. In a context of global crisis, international organizations are guided by the premise of a common response, usually signed in international treaties.

**Objectives:** Thus, this work is guided by the objective of explaining the agriculture-climate change binomial under the 1988 Federal Constitution, the 2030 Agenda and the United Nations Framework Convention (UNFCCC).

**Methodology:** To this end, we used a qualitative approach and the technical tools of a bibliographic and documentary review.

**Results:** What emerges is that the deliberations of the COPs and the 2030 Agenda have favored discussions on technological innovation and the efficiency of systems, to the exclusion of the justice of restructuring.

**Keywords:** Agriculture transition; Fair transition; Sustainable development; common goal.

**AGRICULTURA SUSTENTÁVEL E CRISE CLIMÁTICA; ANÁLISE RELACIONAL NA AGENDA 2030 E NA CQNUMC**

**Contextualização:** Pautado como uma das respostas à crise do clima, o desenvolvimento sustentável carrega, em si, muitos questionamentos como, por exemplo, a vagueza entre a definição teórica e a transposição para o mundo fático. Por consequência, estende suas inconsistências para tudo o que opera em sua lógica, como denota-se na “agricultura sustentável” para a qual a pressão é por produzir cada vez mais, emitindo menos gases que contribuem para o agravamento do efeito estufa. Em um contexto de crise global, os organismos internacionais pautam-se pela premissa de resposta conjunta, normalmente firmados em tratados internacionais.

**Objetivos:** Este trabalho guia-se pelo objetivo de explicitar o binômio agricultura-mudanças climáticas no regime da Constituição Federal de 1988, da Agenda 2030 e da Convenção-Quadro das Nações Unidas (CQNUMC).

**Método:** Denota-se a abordagem qualitativa e os instrumentais técnicos de revisão bibliográfica e documental.

**Resultados:** O que se percebe é que as deliberações nas COPs e da Agenda 2030 têm favorecido discussões sobre inovação tecnológica e eficiência dos sistemas, desconsiderando a justiça da reestruturação.

**Palavras-chave:** Transição agrícola; transição justa; desenvolvimento sustentável; objetivo comum.

**AGRICULTURA SOSTENIBLE Y CRISIS CLIMÁTICA: ANÁLISIS RELACIONAL EN LA AGENDA 2030 Y LA CQNUMC**

**Contextualización del tema:** Posicionado como una de las respuestas a la crisis climática, el desarrollo sostenible conlleva muchos interrogantes, como la vaguedad entre su definición teórica y su transposición al mundo real. Como consecuencia, extiende sus incoherencias a todo lo que opera dentro de su lógica, como la "agricultura sostenible", para la que la presión es producir cada vez más, emitendo menos gases que contribuyen a agravar el efecto invernadero. En un contexto de crisis global, las organizaciones internacionales se guían por la premisa de una respuesta conjunta, generalmente suscrita en tratados internacionales.

**Objetivos:** Este trabajo se guía por el objetivo de explicar el binomio agricultura-cambio climático en la Constitución Federal de 1988, la Agenda 2030 y la Convención Marco de las Naciones Unidas (CMNUCC).

**Metodología:** Se utilizó un enfoque cualitativo y las herramientas técnicas de revisión bibliográfica y documental.

**Resultados:** Lo que surge es que las deliberaciones en las COP y la Agenda 2030 han privilegiado las discusiones sobre la innovación tecnológica y la eficiencia de los sistemas, desatendiendo la justicia de la reestructuración.

**Palabras clave:** Transición agrícola; transición justa; desarrollo sostenible; objetivo común.

## INTRODUCTION

Although it entered the international political agenda definitively just over forty years ago<sup>1</sup> and present as one of the modern paradigms, the sustainable development<sup>2</sup> underpins discussions about sustainable agriculture. However, concrete actions at the international, national, regional, and local levels face obstacles, as reported by various international organizations, including the IPCC.

According to Alberto Acosta, Miriam Lang, and Ulrich Brand, promoting a sustainable development model is impossible due to the deep economic and political roots that still greatly influence the current growth model. Thus, implementing the other dimensions of the sustainability tripod, namely ecological and social, becomes even more utopian.

Rio Costa cautions that sustainability involves not just a set of dimensions, but also the various possible relationships between these dimensions and the starting point of the local context<sup>3</sup>. Additionally, sustainable development lacks a narrow, universal definition and is instead an objective of a dynamic process and a continuous search.

It is important to note that the lack of a clear definition for sustainability allows the concept to be co-opted by those who may not adhere to its principles. This is exemplified by corporations accused of greenwashing<sup>4</sup>.

This article aims to discuss the promotion of sustainable agriculture in the context of the agriculture-climate change binomial under the 1988 Federal Constitution, the 2030 Agenda, and the United Nations Framework Convention (UNFCCC). The approach used is qualitative, and the technical tools of a bibliographical and documentary review are employed.

The initial step is to establish a connection between sustainable agriculture and the 1988 Federal Constitution. Next, we examine the relationship between sustainable agriculture and climate change in the 2030 Agenda and the UNFCCC. The analysis is

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<sup>1</sup> Principle 1 of the Rio Declaration on Environment and Development is explicit: "Human beings are at the center of sustainable development concerns. They have the right to a healthy and productive life in harmony with nature". For more: ONU- Organização das Nações Unidas. **Declaração do Rio sobre Meio Ambiente e Desenvolvimento**. Rio de Janeiro, 1992. Disponível em: [https://cetesb.sp.gov.br/proclima/wp-content/uploads/sites/36/2013/12/declaracao\\_rio\\_ma.pdf](https://cetesb.sp.gov.br/proclima/wp-content/uploads/sites/36/2013/12/declaracao_rio_ma.pdf). Acesso em: 20 mar. 2024.

<sup>2</sup> It's worth noting that, as this is an article, we don't intend to delve into the theoretical discussion that hangs over the difference between the terms sustainable development and sustainability, which is why we take as our basis the authors' writings and their choices about which expression to use.

<sup>3</sup> RIO COSTA, Ana Alexandra Vilela Marta. 2010. Agricultura Sustentável I: conceitos. **Revista de Ciências Agrárias**. Lisboa: Portugal. 33: 61-74. Disponível em: <https://revistas.rcaap.pt/rca/article/view/15872>. (Acesso em: 23 mai. 2023).

<sup>4</sup> Greenwashing refers to disinformation disseminated by a company or conglomerate to generate an image of environmental responsibility in the eyes of the public. For more: MARKHAM, David; KHARE, Anshuman; BECKMAN, Terry. Greenwashing: a proposal to restrict its spread. **Journal of Environmental Assessment Policy and Management**. [sine loco]. Vol. 16, No. 4 (December 2014). Disponível em: <https://www.worldscientific.com.ez316.periodicos.capes.gov.br/doi/epdf/10.1142/S1464333214500306>. Acesso em: 19 mar. 2024.

divided into two parts: i) the relationship between sustainable agriculture and climate change, with a focus on the impacts of agricultural activities; and ii) the approaches to this relationship in the 2030 Agenda and the UNFCCC.

## 1. INTERFACES BETWEEN SUSTAINABLE AGRICULTURE AND BRAZIL'S FEDERAL CONSTITUTION

Like sustainability, sustainable agriculture lacks a strict and defined model. Instead, it is guided by precepts that prioritize respect for local identities, the socio-environmental context, and ensuring the participation of all stakeholders in an egalitarian and supportive manner. To classify agriculture as sustainable, it is essential to preserve the dynamic ecological balance while ensuring decent social conditions and economic viability for the agents involved.

The vagueness of the concept stems from different facts in history and is linked to International Environmental Law (IEL). As Gomes points out, it is possible to identify phases or trends in the brief history of International Environmental Law (IED) that permeate the discussion on sustainability<sup>5</sup>. Since the Johannesburg Conference in 2002, the International Environmental Law (IEL) has been in an impasse phase. The focus of debate and investigation has been abruptly limited to sustainable development.

This impasse can be seen, for example, when the Paris Agreement is binding, i.e. subject to sanctions, but without minimum levels of commitment for countries. This shows the prevalence of Sovereignty over adaptation and mitigation. In short, the state adapts and mitigates what suits it.

This section will address the contradiction in detail by examining the relationship between agriculture and climate change in the context of the United Nations and Brazil's Nationally Determined Targets. As mentioned above, the vagueness of the term sustainable development proliferates to all points that operate within its logic, including sustainable agriculture and it operates in the turbulence of projection to future generations. As Hans Jonas points out, there is a public duty to act in favor of "authentic human life indefinitely"<sup>6</sup>, since the negative effects of the present actions of this collective

<sup>5</sup> As a major milestone, the Stockholm Conference of 1972 represented the undoubted establishment of International Environmental Law as a branch of International Law, and one that is growing exponentially in representativeness. After the 1992 Rio Conference, however, the focus shifted towards anthropocentrism and discussions moved away from environmental issues and towards development under the auspices of sustainable development. These are the phases of International Environmental Law: Phase of indifference (until the 20th century); Phase of discovery (1900 - 1972); Phase of utopia (Stockholm 1972 - Rio 1992); Phase of Realism (Rio 1992 - Johannesburg 2002); Phase of impasse (Johannesburg 2002 - present day). For more: GOMES, Carla Amado. **Direito Internacional do Ambiente** - uma abordagem temática. Lisboa: AAFDL, 2018.

<sup>6</sup> JONAS, Hans. **O princípio da responsabilidade**: ensaio de uma ética para a civilização tecnológica. Rio de Janeiro: Contraponto, 2006. p. 48

ethic add up over time in such a way that it is impossible to return to the starting point. In other words, we could say that we are moving away from the point of return.

Thus, during this phase of the IEL, it is necessary to act to adapt and mitigate while also considering the conditions for future generations. In line with the focus of this section on sustainable agriculture, Jussi Lankoski and Lena Lankoski have identified bottlenecks in agricultural support policies in OECD countries.<sup>7</sup> Two necessary conditions for achieving environmental sustainability in agriculture are political conditions and conditions related to the structure and intensity of production. Public policies that link subsidies to the volume of production tend to reduce the environmental sustainability of agricultural production. On the other hand, public policies that subsidize farmers throughout production, i.e. policies that do not make financial support conditional on the volume of production, create opportunities for greater environmental sustainability<sup>8</sup>.

For instance, investing in public policies to avoid drastic price changes, investing in research, valuing traditional knowledge, or even access to land seem to be more effective possibilities for increasing the environmental sustainability of agriculture. When analyzing different sustainable agriculture initiatives, also come up against the vagueness of the term and this indicates a huge range of possibilities for actions in view of sustainable agriculture<sup>9</sup>. The authors also note the difficulty of measuring sustainability indices for these initiatives<sup>10</sup>.

Thus, there is a management gap between the state and sustainable agriculture, as also proposed by the 2030 Agenda. We believe that once these indicators are established, public-private partnerships would be more efficient for current and future generations. It would also be possible to identify more precisely the bottlenecks and the best possibilities for public support for sustainable agriculture. Furthermore, once the indicators are in place, it would be possible to monitor performance and draw up progression strategies.

This progressiveness also inspires the organization of the Brazilian state, since, by

<sup>7</sup> According to the authors, it was necessary to remove from the analysis countries that are both members of the European Union and the OECD, because the data needed for the research is not officially published. For more: JANKOSKI, Jussi; JANKOSKI, Leena. Environmental Sustainability in agriculture: identification of bottlenecks. **Ecological Economics**. v. 204. 2023. Disponível em: <https://www.sciencedirect.com/science/article/pii/S0921800922003172?via%3Dihub>. Acesso em: 06 jun. 2023.

<sup>8</sup> JANKOSKI, Jussi; JANKOSKI, Leena. Environmental Sustainability in agriculture: identification of bottlenecks. **Ecological Economics**. v. 204. 2023. Disponível em: <https://www.sciencedirect.com/science/article/pii/S0921800922003172?via%3Dihub>. Acesso em: 06 jun. 2023.

<sup>9</sup> KONEFAL, Jason; OLDE, Evelien M.; HATANAKA Maki; OOSTERVEER, Peter J. M. Signs of agricultural sustainability: A global assessment of Sustainability governance initiatives and their indicators in crop farming. [s.l.] **Agricultural Systems**. v. 208. 2023. Disponível em: <https://www.sciencedirect.com/science/article/pii/S0308521X2300063X?via%3Dihub>. Acesso em: 03 jun. 2023.

<sup>10</sup> KONEFAL, Jason; OLDE, Evelien M.; HATANAKA Maki; OOSTERVEER, Peter J. M. Signs of agricultural sustainability: A global assessment of Sustainability governance initiatives and their indicators in crop farming. [s.l.] **Agricultural Systems**. v. 208. 2023. Disponível em: <https://www.sciencedirect.com/science/article/pii/S0308521X2300063X?via%3Dihub>. Acesso em: 03 jun. 2023.



constitutional order, article 225 of the Federal Constitution of 1988, there is express mention of future generations and the minimum environmental quality as a right and duty of the community and the public authorities. Following the international movement for greater public concern for the environment, the Stockholm Conference of 1972 and the Brundtland Report of 1987 were significant events. Nationally, the National Environmental Policy of 1981 was also noteworthy, despite being implemented during the period of the military regime. The National Constituent Assembly (1987-1988) declared the constitutional protection of the environment as a right and duty of the public authorities and the community.

Aimed at protecting the Human Dignity, the Federal Constitution of 1988 (CF/88) constructs a true axiological prism based on this and imposes on the state duties to defend and provide services in relation to fundamental rights. By its very nature, the axiological prism is also culturalist, i.e. it is not a fixed one and takes on new forms as new needs arise<sup>11</sup>.

Now, given the Anthropocene<sup>12</sup> (the Age of Crises), the cultural and relational dimensions of the Human Dignity stand out and allow for new legal-institutional arrangements to deal with the difficult protective mission. Article 225 of the Federal Constitution of 1988 guarantees the fundamental right to an ecologically balanced environment and the duty of the public authorities and the community to defend it<sup>13</sup>. It follows that environmental quality is an indispensable component of human dignity.<sup>14</sup>

Hence, a new model of State, the socio-environmental one<sup>15</sup>, whose aim is to

<sup>11</sup> FENSTERSEIFER, Tiago. **Direitos fundamentais e proteção do ambiente: a dimensão ecológica da dignidade humana no marco jurídico-constitucional do Estado Socioambiental de Direito**. Porto Alegre: Livraria do Advogado, 2008.

<sup>12</sup> Luiz Marques characterizes them as systemic, ubiquitous and synergistic crises: the climate crisis, the biodiversity loss crisis and the organism intoxication crisis. Providing scientific evidence for the above understanding, the Stockholm Resilience Center has systematized the Planetary Boundaries. More scientific evidence is condensed by the Intergovernmental Panel on Climate Change - IPCC, in its Report 6. Tipping points represent inexorable barriers to the Earth system. They are defined as focal limits where changes have affected a given system in a non-linear way, where even if the causes of change are stopped, there is no regeneration to the *status quo*. For more: MARQUES, Luiz. **Capitalismo e colapso ambiental**. E-book. 3ª ed. ver. atual. Campinas, SP: Editora da Unicamp, 736 p. 2018.; STOCKHOLM RESILIENCE CENTER. **The nine planetary boundaries**. Disponível em: <https://www.stockholmresilience.org/research/planetary-boundaries/the-nine-planetary-boundaries.html>. Acesso em: 15 nov. 2022.; INTERGOVERNAMENTAL PAINEL ON CLIMATE CHANGE- IPCC. 2021. **Climate Change 2021: The Physical Science Basis**. [Sine loco]. Disponível em: [https://report.ipcc.ch/ar6/wg1/IPCC\\_AR6\\_WGI\\_FullReport.pdf](https://report.ipcc.ch/ar6/wg1/IPCC_AR6_WGI_FullReport.pdf). Acesso em: 23 set. 2022.

<sup>13</sup> BRASIL. **Constituição da República Federativa do Brasil de 1988**. Brasília, DF: Presidência da República. [2023]. Disponível em: [http://www.planalto.gov.br/ccivil\\_03/constituicao/constituicao.htm](http://www.planalto.gov.br/ccivil_03/constituicao/constituicao.htm). Acesso em: 02 jun. 2023.

<sup>14</sup> According to the Inter-American Court of Human Rights, in Advisory Opinion 23 of November 15, 2017, the exercise of other human rights presupposes minimum environmental quality. For more: CIDH - CORTE INTERAMERICANA DE DERECHOS HUMANOS. **Opinión Consultiva 23/17: obligaciones estatales en relación con el medio ambiente en el marco de la protección y garantía de los derechos a la vida y a la integridad personal - interpretación y alcance de los artículos 4.1 y 5.1, en relación con los artículos 1.1 y 2 de la convención americana sobre derechos humanos**. 15 de noviembre de 2017. Disponível em: [https://www.corteidh.or.cr/docs/opiniones/seriea\\_23\\_esp.pdf](https://www.corteidh.or.cr/docs/opiniones/seriea_23_esp.pdf). 2017. Acesso em: 28 ago. 2020.

<sup>15</sup> Term used by Antônio Herman Benjamin in the work he coordinated: *Environmental Damage: Prevention, Reparation and Repression*, published by **Revista dos Tribunais** in 1993.

converge the social agenda and the environmental agenda "in the same legal-political project"<sup>16</sup>. The term 'Socio-Environmental State' is necessary because the project of the Welfare State has not been completed, particularly regarding second-dimension rights<sup>17</sup>. In this way, the socio-environmental state opens up the social dimension and the ecological dimension of fundamental rights - which also constitute the dense core of Human Dignity. With reinforced protective duties and combining the achievements of previous state models (e.g. greater protection of the Human Dignity), the Socio-Environmental State incorporates a new trans-individual legal paradigm based on solidarity in the broadest sense (between nations, between individuals of any kind and between generations)<sup>18</sup>.

Therefore, protecting the dense core of Human Dignity is an essential aspect of the Socio-Environmental State, which is inevitably linked to a healthy and balanced environment. Agriculture poses various threats to sustainability, and therefore, it may require structural changes that contribute to adaptation and mitigation during the catastrophic stage of the climate crisis.

In a globalized world, the international scenario also has cross-border effects - especially in the case of Brazil, which is known for its great capacity to export commodities. This brings us to the main objective of this paper: what role does and can the agricultural sector play in achieving the country's climate agenda? The next section is the result of our efforts in this direction.

## 2. THE AGRICULTURE-CLIMATE CHANGE BINOMIAL IN THE UNITED NATIONS FRAMEWORK CONVENTION (UNFCCC) REGIME

After presenting a portrait of sustainable agriculture in Brazil, it is imperative to understand the international obligations that Brazil, and consequently its agricultural sector, faces under the United Nations Framework Convention on Climate Change (UNFCCC).

### 2.1 The agriculture-climate change binominal

Although climate change is closely linked to the historic burning of fossil fuels, mainly by developed countries, and for this reason there is an almost automatic association of this source as the direct cause of global warming in the collective imagination, it is not the only one. The increase in greenhouse gas (GHG) emissions is also

<sup>16</sup> FENSTERSEIFER, Tiago. **Direitos fundamentais e proteção do ambiente**: a dimensão ecológica da dignidade humana no marco jurídico-constitucional do Estado Socioambiental de Direito. Porto Alegre: Livraria do Advogado. 2008. p. 94

<sup>17</sup> FENSTERSEIFER, Tiago. **Direitos fundamentais e proteção do ambiente**: a dimensão ecológica da dignidade humana no marco jurídico-constitucional do Estado Socioambiental de Direito. Porto Alegre: Livraria do Advogado. 2008.

<sup>18</sup> FENSTERSEIFER, Tiago. **Direitos fundamentais e proteção do ambiente**: a dimensão ecológica da dignidade humana no marco jurídico-constitucional do Estado Socioambiental de Direito. Porto Alegre: Livraria do Advogado. 2008.



due to other sources, such as changes in land use and agricultural practices, which are highly emitting sectors in emerging countries such as Brazil.

The climate transition aims to decarbonize all sectors of the global economy by reducing all greenhouse gases (GHGs), including CH<sub>4</sub>, N<sub>2</sub>O, CFCs, O<sub>3</sub>, and others, not just CO<sub>2</sub> resulting from fossil fuel combustion. Therefore, mitigation and adaptation measures will be heterogeneous and vary according to the types of gases emitted and the transition required for each sector. Agriculture is no exception.

While developed countries focus on decarbonization primarily in the energy and industrial sectors, converting their carbon-dependent matrices to alternative and renewable energy sources, without however, it is worth criticizing, promoting parallel discussions on the need to reduce consumption, countries with economies based on the export of agricultural inputs should pay attention to the so-called AFOLU or LULUCF sources.<sup>19</sup> This is because, "while life without fossil fuels is necessary, life without food is impossible"<sup>20</sup>.

The mathematics of the agricultural sector differ from those of other sectors. While the use of fossil fuels must be eliminated and replaced with renewable sources, agriculture must simultaneously increase production to meet the needs of a growing global population while reducing emissions. There is no substitute or alternative renewable source formula for the structural transformation of the agricultural sector. This transformation necessarily involves redefining its own production model to become more sustainable and less aggressive towards the environment and climate.

Agricultural activities are included in the AFOLU or LULUCF categories, which are acronyms used by scientific entities like the IPCC to separate emissions by sources and sectors (such as energy, industry, and waste). This helps to identify the most emitted GHGs and establish sector-specific mitigation and adaptation measures.

Agriculture is just one of the species within the genus "land uses". In countries with agro-export economies, such as Brazil, land uses are closely related to the processes of soil conversion or change in land use. The deforestation of forest areas for conversion into monoculture areas, which transform natural carbon sinks into open fields for pastures and the cultivation of monocultures such as soybeans, is the great villain of the GHG emissions that characterize LULUCF's land use-change.

It's true that within each of these activities there is a wide range of subspecies, such

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<sup>19</sup> AFOLU encompasses agriculture, forestry and other land use, while LULUCF is the combination of land use, land use-change and forestry. Regardless of which acronym is used, both have agricultural, forestry and land use activities under their umbrella.

<sup>20</sup> IIAC. **COP 27**: Growing roles for Agriculture and Food Security. Disponível em: <https://blog.iica.int/en/blog/cop27-growing-roles-agriculture-and-food-security>. 2023. Acesso em 22 de mai. 2023. Texto digital.

as horticulture, fruit growing, forestry and others, but bringing them all together under the same genre, represented by the acronyms, makes it easier to find a common denominator for their emission contribution and therefore helps to target measures. Even so, the inventory of estimated AFOLU emissions can be difficult to gather, especially if we consider the difficulties inherent in collecting data in sectors such as change in land use, more specifically from deforestation, the sources of which are naturally sparse<sup>21</sup>.

Agriculture is highly dependent on climate conditions and, at the same time as it exploits natural resources such as soil and water and emits GHGs, it suffers the effects of climate stress head-on, more severely than other sectors<sup>22</sup>. Agricultural crops dominate around 40% of the earth's surface<sup>23</sup>, which suggests the extent of the sector's pollution on global indices and the challenges of adapting to climate impacts<sup>24</sup>.

LULUCF emits three main GHGs: CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. Deforestation is the primary source of carbon dioxide (CO<sub>2</sub>) emissions, which contribute significantly to global warming due to their high quantity and long atmospheric lifespan. Livestock farming, enteric fermentation by animals, manure management, and crops such as rice are the primary sources of methane (CH<sub>4</sub>) emissions. Nitrous oxide (N<sub>2</sub>O) is the greenhouse gas most commonly emitted by agricultural practices. It is primarily produced through the use of synthetic fertilizers and manure on soil to promote higher crop yields. N<sub>2</sub>O is released through processes such as nitrification and denitrification that occur in soil, which increases the concentration of this greenhouse gas in the atmosphere<sup>25</sup>.

To address this reality, the agricultural sector can take measures such as proper management, improving soil health and fertility, and implementing no-till farming and

<sup>21</sup> Although significant, agriculture's contribution to GHG emissions is difficult to estimate. For more: CZYŻEWSKI, Bazyli; KRYSZAK, Łukasz. Approaching Agri-Environmental Policy Effectiveness. In: **Sustainable Agriculture Policies for Human Well-Being**. [s.l.]: Springer. 2022. Disponível em: [https://doi.org/10.1007/978-3-031-09796-6\\_4](https://doi.org/10.1007/978-3-031-09796-6_4). Acesso em 22 mai. 2023.

<sup>22</sup> GÖKKÜR, Salih; ÇAĞIR, Fatih, ARDA, Ertuğrul. Climate change and sustainable agriculture. **Journal for the Agriculture, Biotechnology and Education**. 2022. Disponível em: <https://jabedu.com/index.php/jabedu/article/view/2/4>. Acesso em: 25 mai. 2023.

<sup>23</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023.

<sup>24</sup> According to IICA, agriculture is both a tributary and a victim of climate change. While it faces high risks from a phenomenon that alters rainfall patterns and damages soil fertility, it is also responsible for more than 1/3 of global GHG emissions. In 2018, the LULUCF sector was estimated to emit around 9.3 GtCO<sub>2</sub>eq worldwide, resulting in a 14% increase in emissions compared to the beginning of the millennium. For more: IICA. **COP 27: Growing roles for Agriculture and Food Security**. Disponível em: <https://blog.iica.int/en/blog/cop27-growing-roles-agriculture-and-food-security>. 2023. Acesso em 22 de mai. 2023.; CZYŻEWSKI, Bazyli; KRYSZAK, Łukasz. Approaching Agri-Environmental Policy Effectiveness. In: **Sustainable Agriculture Policies for Human Well-Being**. [s.l.]: Springer. 2022. Disponível em: [https://doi.org/10.1007/978-3-031-09796-6\\_4](https://doi.org/10.1007/978-3-031-09796-6_4). Acesso em 22 mai. 2023.

<sup>25</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023.

agro-ecological practices. These measures can help reduce greenhouse gas emissions from agricultural crops and contribute to the sector's mitigation efforts against climate change. All economic sectors have an obligation to halt the advance of the crisis.

However, agricultural systems also have a passive vector, of vulnerability in receiving the inevitable risks and impacts of climate change and, for this reason, they have the right to receive from the Government the conditions to create resilience and promote the necessary adaptation, to prevent and minimize the effects of a changing and extreme climate<sup>26</sup>.

## 2.2 The impacts of agricultural activities

Agricultural activities inevitably cause changes in the ecosystems in which they are practiced. The impacts are different because the types of crops, scales of production, technologies used and agents involved are also different. It's not a stretch to say, therefore, that the impacts of industrial, large-scale or conventional monocultural farming practices are different from those of family, small-scale, sustainable or agroecological farming.

The importance of mitigation measures for each type of crop also varies, for example, horticulture has great potential to curb emissions from the sector, since it provides better carbon absorption compared to other types of crop<sup>27</sup>. On the other hand, fruit growing will suffer the most from the effects of a changing climate, while perennial plants will suffer more from the consequences of extreme temperatures<sup>28</sup>. Being heterogeneous, the agents' capacities to sponsor the necessary adaptations to the current production model are also different: small farmers do not have the same capital and technology to protect themselves from the impacts of the climate as large producers of inputs.

The main cause of GHG emissions in agriculture is related to changes in the global cycles of carbon, stored in plants and also in soils, and nitrogen, with the rampant use of synthetic nitrogen fertilizers, mainly since 1950, to prepare soils and increase crop yields. Another factor contributing to agricultural emissions, in association with livestock farming, is the release of methane as a result of raising livestock and growing certain

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<sup>26</sup> EMBRAPA. **Desdobramentos da recente contribuição nacionalmente determinada – NDC**. [s.l.] [s.d.] Disponível em: <https://www.embrapa.br/visao-de-futuro/adaptacao-a-mudanca-do-clima/sinal-e-tendencia/desdobramentos-da-recente-contribuicao-nacionalmente-determinada-ndc>. Acesso em 18 de mai. 2023.

<sup>27</sup> GÖKKÜR, Salih; ÇAĞIR, Fatih, ARDA, Ertuğrul. Climate change and sustainable agriculture. **Journal for the Agriculture, Biotechnology and Education**. 2022. Disponível em: <https://jabedu.com/index.php/jabedu/article/view/2/4>. Acesso em: 25 mai. 2023.

<sup>28</sup> GÖKKÜR, Salih; ÇAĞIR, Fatih, ARDA, Ertuğrul. Climate change and sustainable agriculture. **Journal for the Agriculture, Biotechnology and Education**. 2022. Disponível em: <https://jabedu.com/index.php/jabedu/article/view/2/4>. Acesso em: 25 mai. 2023.

crops<sup>29</sup>. According to Czyzewski, LULUCF is responsible for 49% of global methane emissions, 66% of nitrogen and 15% of carbon, with future increases projected due to population growth, especially in developing countries<sup>30</sup>.

Having mapped out the sector's main sources of emissions, we now need to list what can be done to mitigate them. There are a multitude of policies that can be adopted to this end, but below we will list just a few that the literature has already compiled: a) encouraging sowing or no-till techniques, b) combining agro-ecological and sustainable techniques, c) reducing the consumption of synthetic nitrogen fertilizers, d) increasing the efficiency of production processes and the sustainable management of the resources used in them, e) reducing the energy intensity of crops, f) the recovery of degraded soils, g) carbon sequestration with improved forest management, h) the production of biofuels and i) the coordination of local actions by interest groups involved in the sector, such as investors, farmers, governments, research bodies, companies and others<sup>31</sup>.

Although the climate emergency is a global crisis, its effects are distributed unevenly. Therefore, the creation of resilience must be driven by local actors who receive necessary incentives from national and international bodies. In agriculture, the adaptive aspect is even more urgent due to its high vulnerability to climate variability. Climate impacts are already affecting agricultural production and are expected to worsen in the future, making food production even more crucial. While the terms are sometimes used interchangeably, the agricultural system encompasses not only food production but also other inputs with varying impacts, such as textile fibers and biofuels.

It is certain that the food system depends entirely on agriculture, but it also involves other processes such as distribution, transportation and consumption. The agricultural and food chains, although not unique, are inseparable and the effects of climate change on one and the other have mutual impacts. The most serious effect of an agricultural system that is not very resilient to the climate is precisely the vulnerability of

<sup>29</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023

<sup>30</sup> CZYŻEWSKI, Bazyli; KRYSZAK, Łukasz. Approaching Agri-Environmental Policy Effectiveness. In: **Sustainable Agriculture Policies for Human Well-Being**. [s.l.]: Springer. 2022. Disponível em: [https://doi.org/10.1007/978-3-031-09796-6\\_4](https://doi.org/10.1007/978-3-031-09796-6_4). Acesso em 22 mai. 2023.

<sup>31</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023; GÖKKÜR, Salih; ÇAĞIR, Fatih, ARDA, Ertuğrul. Climate change and sustainable agriculture. **Journal for the Agriculture, Biotechnology and Education**. 2022. Disponível em: <https://jbedu.com/index.php/jbedu/article/view/2/4>. Acesso em: 25 mai. 2023.; CLIMATESHOT. **A Global Action Agenda for Innovation in Agriculture**. [s.n.] 2021. Disponível em: [https://webarchive.nationalarchives.gov.uk/ukgwa/20230401054904/https://ukcop26.org/wp-content/uploads/2021/11/Climate\\_Shot\\_Global\\_Action\\_Agenda.pdf](https://webarchive.nationalarchives.gov.uk/ukgwa/20230401054904/https://ukcop26.org/wp-content/uploads/2021/11/Climate_Shot_Global_Action_Agenda.pdf). Acesso em 20 de mai. 2023.

the main product of the functioning of the food system: food security and nutrition<sup>32</sup>. Increasing production deficits, affected both quantitatively and qualitatively by rising temperatures, soil degradation and water scarcity, have a direct impact on the global food supply chain.

Climate change exacerbates the fragility of the stages that make up Food Security: production, distribution and access to food, and thus the entire integrity of this system<sup>33</sup>. Research shows that the sector's production capacity has fallen by 21% since 1961, due to the consequences of the crisis that has already taken hold. By 2050, when a new record in the size of the global population is projected (10 billion people), agricultural production will need to be increased by around 60% to supply the food supply chain, taking 2010 production rates as a parameter<sup>34</sup>. The key challenge for adaptation strategies, therefore, is to ensure that productivity increases without further increasing the sector's emissions. The sector is facing, and may continue to face with greater intensity and frequency, many other harmful effects of the climate, such as:

a) the reduction in yields of key and climatically more sensitive agricultural crops such as rice, wheat and maize<sup>35</sup>;

b) small-scale farmers in developing countries, who have contributed the least to GHG emissions, will be the most affected by its effects, since the damage to their crops will be even more severe, if we consider that climate stress and the occurrence of floods, droughts and dry spells will occur more intensely and frequently in these countries<sup>36</sup>;

c) the hydrological cycle and the rainfall regime will undergo substantial changes,

<sup>32</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023

<sup>33</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023

<sup>34</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023; CLIMATESHOT. **A Global Action Agenda for Innovation in Agriculture**. [s.n.] 2021. Disponível em: [https://webarchive.nationalarchives.gov.uk/ukgwa/20230401054904/https://ukcop26.org/wp-content/uploads/2021/11/Climate\\_Shot\\_Global\\_Action\\_Agenda.pdf](https://webarchive.nationalarchives.gov.uk/ukgwa/20230401054904/https://ukcop26.org/wp-content/uploads/2021/11/Climate_Shot_Global_Action_Agenda.pdf). Acesso em 20 de mai. 2023.

<sup>35</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023

<sup>36</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023; CLIMATESHOT. **A Global Action Agenda for Innovation in Agriculture**. [s.n.] 2021. Disponível em: [https://webarchive.nationalarchives.gov.uk/ukgwa/20230401054904/https://ukcop26.org/wp-content/uploads/2021/11/Climate\\_Shot\\_Global\\_Action\\_Agenda.pdf](https://webarchive.nationalarchives.gov.uk/ukgwa/20230401054904/https://ukcop26.org/wp-content/uploads/2021/11/Climate_Shot_Global_Action_Agenda.pdf). Acesso em 20 de mai. 2023.



with an accentuated greenhouse effect, which could jeopardize access to water for irrigating crops and therefore their yields<sup>37</sup>;

d) with changes in the supply of water for irrigation, droughts and dry spells will become more intense, and these are the phenomena that most threaten the sector's productivity. More arid soils determine not only the volume of the harvest, but also its quality. Desertification and land degradation are also expected impacts of the climate on the countryside, making it less productive and reducing its fertility<sup>38</sup>;

e) less visible aspects of climate change in agricultural production are the loss of phytogenetic diversity associated with crops. Some authors also point to a change in the phenology of some varieties and a weakening of the formation of bee hives, affecting pollination<sup>39</sup>;

The arsenal of impacts suffered by agriculture is growing as scientific studies advance and as emissions fail to be mitigated. Therefore, adapting to them, both contemporaneously and preventively, is a fundamental task to ensure the sustainability of agricultural and food systems. In the literature, there are many adaptive approaches that seek to create the necessary resilience of these systems against the impacts of climate change, such as the ecosystem approach and agronomic adaptation that form the basis of Climate Smart Agriculture (CSA), proposed by Venkatramanan and Shah<sup>40</sup>.

The implementation of the adaptive approach in agriculture also involves recognizing the value of the traditional knowledge of local communities and indigenous peoples<sup>41</sup> in association with technical-scientific knowledge, since it is these groups that have the best knowledge of their own realities and can contribute to local adaptive

<sup>37</sup> According to the theorists, extreme temperatures are expected to accelerate the hydrological cycle, since evaporation rates on land and in the sea will be higher. The result is more intense rainfall in tropical areas and more droughts and dry spells in commonly arid and semi-arid areas. For more: BENKEBLIA, Nouredine; AL-TAWAHA, Abdel Rahman Mohammad Said. Climate Change and Agriculture: State of the Art, Challenges, and Perspectives. In: BENKEBLIA, Nouredine (org). **Climate Change and Agriculture: Perspectives, Sustainability and Resilience**. 2022. Disponível em: <https://onlinelibrary.wiley.com/doi/abs/10.1002/9781119789789.ch1>. Acesso em: 18 mai. 2023.

<sup>38</sup> GÖKKÜR, Salih; ÇAĞIR, Fatih, ARDA, Ertuğrul. Climate change and sustainable agriculture. **Journal for the Agriculture, Biotechnology and Education**. 2022. Disponível em: <https://jabedu.com/index.php/jabedu/article/view/2/4>. Acesso em: 25 mai. 2023.; BENKEBLIA, Nouredine; AL-TAWAHA, Abdel Rahman Mohammad Said. Climate Change and Agriculture: State of the Art, Challenges, and Perspectives. In: BENKEBLIA, Nouredine (org). **Climate Change and Agriculture: Perspectives, Sustainability and Resilience**. 2022. Disponível em: <https://onlinelibrary.wiley.com/doi/abs/10.1002/9781119789789.ch1>. Acesso em: 18 mai. 2023.

<sup>39</sup> GÖKKÜR, Salih; ÇAĞIR, Fatih, ARDA, Ertuğrul. Climate change and sustainable agriculture. **Journal for the Agriculture, Biotechnology and Education**. 2022. Disponível em: <https://jabedu.com/index.php/jabedu/article/view/2/4>. Acesso em: 25 mai. 2023.

<sup>40</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023.

<sup>41</sup> SARKU, Rebecca; TAUZIE, Mapenzie; WHITFIELD, Stephen. Making a case for just agricultural transformation in the UNFCCC: An analysis of justice in the Koronivia Joint Work on Agriculture. **Frontiers in Sustainable Food Systems**. v. 6. 2023.



solutions. Sustainable practices such as integrated crop management, the efficient use of resources<sup>42</sup> the proper disposal of production waste and improving the efficiency of irrigation processes are also adaptive measures that can generate a positive response in the sector. Finally, a less obvious factor, but one that can contribute greatly to the adaptive capacity of agriculture, is the development of inventories of phytogenetic resources and the selection of varieties that are more resistant to extreme weather, so that biological diversity is ensured and the most resilient species enable the necessary productivity<sup>43</sup>.

## 2.3 The binomial in the 2030 Agenda and the UNFCCC

In International Environmental Law (IEL), the agriculture-climate change binomial has already been touched on in some soft and hard law instruments. In most of them, the mutual implication occurs in the broad spectrum of the so-called "green transition" or "structural transformation" towards a carbon-neutral economy. Agriculture recurrently appears as an important sector on two fronts: (i) in the effort to mitigate GHG emissions, which characterize climate change, and (ii) in the demand for adaptation measures, given the vulnerabilities caused and accentuated by the same phenomenon. Cohesive guidelines between policies adopted on a local, regional and international scale are fundamental to the success of the mitigation and adaptation measures that characterize the sector-by-sector decarbonization process. Without strengthening multilateral cooperation, this will become increasingly difficult<sup>44</sup>.

This is because it is not enough for just a few states, namely the more developed ones, to take on a climate transition agenda with emission reduction policies, since the expected results will have to meet a common ambition of keeping the average global temperature within the limits set out in the Paris Agreement. Furthermore, it is not enough for adaptive structures to be concentrated only in the countries that have the largest and best conditions to finance them, since the lack of measures to foster resilience in developing countries also has a strong relationship with the upsurge in migratory flows towards those countries that already have greater structural resilience.

In this sense, sponsored by the richest and historically most polluting countries,

<sup>42</sup> VENKATRAMANAN, V.; SHAH, Shachi. 2019. Climate smart agriculture technologies for environmental management: the intersection of sustainability, resilience, wellbeing and development. **Sustainable green technologies for environmental management**. 2019. Disponível em: [https://link.springer.com/chapter/10.1007/978-981-13-2772-8\\_2#citeas](https://link.springer.com/chapter/10.1007/978-981-13-2772-8_2#citeas). Acesso em 25 mai. 2023

<sup>43</sup> GÖKKÜR, Salih; ÇAĞIR, Fatih, ARDA, Ertuğrul. Climate change and sustainable agriculture. **Journal for the Agriculture, Biotechnology and Education**. 2022. Disponível em: <https://jabedu.com/index.php/jabedu/article/view/2/4>. Acesso em: 25 mai. 2023.

<sup>44</sup> The obligation of states with regard to mitigation measures is either individualized, with internal guidelines for reduction in their own public climate policies, or internationalized, with the Nationally Determined Contribution presented to the UNFCCC. For more: MINASSA, Pedro Sampaio. Políticas Públicas em tempos de mudanças climáticas: medidas de mitigação e adaptação no enfrentamento da crise. **Revista de Finanças Públicas e Direito Fiscal**. IDEFF, 2023b, p. 101-104.

the strengthening of constituted funds and the implementation of mechanisms for capacity building and the transfer of technology and financial resources, both provided for in the UNFCCC (articles 4/3, 4/4 and 11), not only make adaptation feasible for the poorest countries, but also give substance to the principle of common but differentiated responsibilities<sup>45</sup>.

The 2030 Agenda for Sustainable Development, established by the United Nations General Assembly in 2015, is an example of a soft law instrument that directly and indirectly addresses the relationship between sustainability and development through its 17 Sustainable Development Goals (SDGs) and 169 targets. The 2030 Agenda is a comprehensive and cross-cutting plan that follows on from Agenda 21 and its Millennium Development Goals (MDGs) to address the world's major challenges by 2030, with intermediate deadlines of 2020 and 2025. As a clear example of soft law, the provisions of this agreement are non-legally binding on signatory states.

However, despite its mitigated cogency, the Agenda is a piece of legislation that communicates with other international instruments, including the UNFCCC itself<sup>46</sup>, presents the agriculture-climate change binomial consistently. When describing in general terms the targets of the "new Agenda", the Declaration expressly mentions the agricultural sector in paragraphs 24 and 27. In paragraph 24, dedicated to explaining the objectives of eradicating poverty, hunger and all forms of malnutrition, the sector appears as the recipient of the commitment of resources for the promotion of sustainable agriculture and the development of rural areas, with special attention to farmers in the least developed countries.

The inevitable interrelationship between sustainable agriculture and food security is also the focus of SDG 2, entitled "End hunger, achieve food security and improved nutrition and promote sustainable agriculture". The focus of paragraph 27, meanwhile, is economic development. In it, agriculture appears as one of the sectors to have its productive capacity strengthened and its structural transformation promoted. Therefore, the notion of sustainability sought by the Agenda and its SDGs, including for agriculture, will be rooted in an economic-developmental model that underlies the clumsy formula - for some, the principle - of sustainable development.

In SDG 2, which is entirely dedicated to agricultural and food systems, 2030 is the common deadline for three targets related to the binomial, namely: 2.1, 2.3 and 2.4. Target 2.1 aims to end hunger by guaranteeing access to safe, nutritious and sufficient food,

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<sup>45</sup> MINASSA, Pedro Sampaio. Políticas Públicas em tempos de mudanças climáticas: medidas de mitigação e adaptação no enfrentamento da crise. **Revista de Finanças Públicas e Direito Fiscal**. IDEFF, 2023b, p. 101-104.

<sup>46</sup> Although SDG 13 is made up of specific targets for combating climate change and its impacts, it expressly recognizes that the UNFCCC is the appropriate international forum for addressing and monitoring such measures.

which depends heavily on increasing the productivity and efficiency of sustainable agricultural practices, which is included in target 2.3. In the latter, small-scale producers, indigenous peoples and women should receive greater attention from states, through the payment of better incomes and secure and equal access to land and agricultural inputs, resources and knowledge. Land tenure regularization and legal recognition of land ownership for these actors therefore have a considerable link to achieving a more productive, egalitarian, efficient and sustainable system.

Finally, target 2.4 of SDG 2 focuses on the adaptive aspect of agricultural and food systems. By proposing that the creation of resilience be the subject of constant improvement - in the same logic of progressivity presented in Brazil's Federal Constitution - the Agenda seeks to increase the sector's productivity, without neglecting the preservation of the ecosystems in which it is inserted, and to increase its capacity to cope with extreme weather conditions, droughts, floods and other related events.

Climate change, in turn, is the motto of SDG 13, which proposes targets for: a) creating adaptive capacity to deal with its impacts (target 13.1); b) integrating policies drawn up nationally and internationally in terms of mitigating emissions (target 13.2); c) promoting the capitalization of funds such as the Green Climate Fund; and d) implementing the commitments made by developed countries under the UNFCCC to provide annual resources to enable structural transformation in the least developed countries.

The intersection between SDG 2 and SDG 13 exposes the inseparable link between agriculture and climate change. The transition from the "conventional" or "traditional" agricultural system - and therefore the food system - to a more sustainable, responsible and less GHG-emitting sector, as predicted by SDG 2, is indispensable for combating climate change and therefore achieving SDG 13.

In the same sense, but in the opposite direction, the guarantee of resilience, adaptive capacity, means and resources to implement the structural transformation of the sector, especially in underdeveloped countries, depends heavily on the effectiveness of the mechanisms and funds that have been set up, but which have not yet played their part in halting the advance of contemporary climate impacts on small farmers in the poorest countries and, above all, on the poorest farmers in these countries. Thus, SDG 2 also depends on meeting and implementing the targets set out in SDG 13.

The 2030 Agenda highlights the intrinsic relationship between agricultural production, food security, and combating hunger and malnutrition, particularly in the face of climate challenges, in SDG 2. Inequalities in food distribution, both between and within countries, persist even in top international producers of primary inputs, and are exacerbated by the worsening climate crisis and occurrence of extreme events.

If mitigation and adaptation measures for the agricultural system are not integrated with similar measures for the food system, they could result in greater inequalities. Climate change poses new risks to the food production, distribution, and consumption chain, while also exacerbating pre-existing issues.

Maciel, Troian and Oliveira<sup>47</sup> bring these obstacles to realizing the ambitions of SDG 2 to the Brazilian reality, when they demonstrate the paradox that distances the country from meeting the targets associated with that Goal: at the same time as Brazil produces super crops, a significant portion of its population lives with hunger and food insecurity. This, moreover, confirms the idea that it is not enough to be a major input-producing state, or to boost productivity, resilience and efficiency in agricultural practices, in order to comply with SDG 2.

If the produced output is not utilized to combat hunger, malnutrition, and all forms of food insecurity, then the sustainable development policy has failed in that state. In the case of Brazil, this violation of the constitutional precept mentioned above is evident. The 2030 Agenda calls for a structural transformation of both the agricultural and food sectors. This includes promoting agro-ecological practices, ensuring equal access to healthy and nutritious food, and recognizing the important role of small and medium-sized family farmers in the production and distribution chain, all towards achieving carbon neutrality.

The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992. It is considered soft law, however, it can lead to protocols and agreements that contain more specific and mandatory obligations for states. The Convention differs from the 2030 Agenda in form and content. It is not an action plan with broad goals and targets for sustainable development, but rather a text that deals with means, measures, mechanisms, and bodies to regulate coping with and adapting to the climate crisis.

Only in Article 4, which lays down more general obligations for the Parties, does the binomial of agriculture and climate change appear in the UNFCCC. With its characteristic margin of flexibility, the Convention requires states, in accordance with their own "priorities, circumstances and objectives", to (i) promote and cooperate in the development of practices and processes to control, reduce and prevent emissions in sectors such as agriculture (article 4/c) and (ii) cooperate in adapting to the impacts of the phenomenon and develop adequate and integrated plans for the sector.<sup>48</sup> It is clear

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<sup>47</sup> MACIEL, Mitili Daian Alves; TROIAN, Alessandra; OLIVEIRA, Sibeles Vasconcelos de. Brasil do agro, país da fome: pensando estratégias para o desenvolvimento sustentável. *Cuadernos Venezolano de Sociología*, v. 31, n. 3, 2022. Disponível em: [https://ve.scielo.org/scielo.php?pid=S1315-00062022000300023&script=sci\\_abstract](https://ve.scielo.org/scielo.php?pid=S1315-00062022000300023&script=sci_abstract). Acesso em: 19 mai. 2023.

<sup>48</sup> In Brazil, the UNFCCC was enacted by Executive Decree No. 2,652/1998.

that the law addresses both mitigation measures (controlling, reducing and preventing GHG emissions) and adaptation measures (through appropriate and integrated sectoral plans) to climate change.

The UNFCCC does not expressly mention agriculture in other parts of the text, nor does it provide further details on how these measures should be implemented. It only points to the common but differentiated responsibilities of states in fulfilling these obligations, especially with regard to financing mechanisms and technological transfer. However, there are those who identify, already in its preamble, an indication that agriculture lays the "foundations" of the text<sup>49</sup>.

The preamble of the Convention recognizes agriculture as a fundamental sector by stating that greenhouse gas emissions must be stabilized within a sufficient period of time to ensure that food production is not threatened. Although, mitigation and adaptation measures are not solely focused on ensuring food security and stability. The agricultural system has multiple objectives, one of which is to ensure that food production is not threatened. However, it is also concerned with the impacts of commodity production and other non-nutritional impacts such as biofuels and textile fibers.

Even so, the umbilical relationship between the systems is noticeable both in the UNFCCC and in the protocols and agreements that followed in its wake. During COP 26, one of the major bottlenecks identified in these systems by the Global Action Agenda was the failure to direct the large investments in research and technological innovation towards low-carbon agricultural practices.

Even though there is a significant amount of funding for innovation in the sector, the vast majority still doesn't emphasize the climate transition towards a more resilient and less polluting agriculture, but only prioritizes increasing production efficiency. According to the initiative, less than 7% of the annual billionaire contributions to agriculture around the world go towards improving the environment and combating climate change and its effects on crops. By 2022, the investments available to address this issue would only guarantee 40% of the mitigation needed to meet the Paris targets and practically nothing to boost adaptation in the sector<sup>50</sup>.

Mitigation and adaptation measures, which are responsible for structurally transforming the agricultural sector into a low GHG emitter with the capacity to cope with

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<sup>49</sup> IIAC. **COP 27: Growing roles for Agriculture and Food Security**. Disponível em: <https://blog.iica.int/en/blog/cop27-growing-roles-agriculture-and-food-security>. 2023. Acesso em 22 de mai. 2023.

<sup>50</sup> CLIMATESHOT. **A Global Action Agenda for Innovation in Agriculture**. [s.n.] 2021. Disponível em: [https://webarchive.nationalarchives.gov.uk/ukgwa/20230401054904/https://ukcop26.org/wp-content/uploads/2021/11/Climate\\_Shot\\_Global\\_Action\\_Agenda.pdf](https://webarchive.nationalarchives.gov.uk/ukgwa/20230401054904/https://ukcop26.org/wp-content/uploads/2021/11/Climate_Shot_Global_Action_Agenda.pdf). Acesso em 20 de mai. 2023.

climate impacts, need greater investment in terms of innovation.<sup>51</sup> However, it's not just a question of increasing total investments, but of better channeling resources into what is most urgent: agriculture's climate transition. The scarcity of investment is all the more evident when it comes to the Global North-South divide.

While developed countries have more flexible budgetary margins for applying resources to innovation in the sector, developing and underdeveloped countries have to deal with considerable shortfalls. The UNFCCC's mechanisms for transferring resources and building capacity for technological innovation are essential if the sector's transition is to take place equitably and not be concentrated only in those states that have the greatest and best conditions for mitigation and adaptation.

To ignore the existing divide between the capacities of agricultural actors in the Global North and South to reduce emissions and build resilience is to make the common goal at the heart of the Framework Convention and detailed in the Paris Agreement unfeasible. Not only that, but it also undermines the principle of common but differentiated responsibilities, since the contribution to the crisis and the acceptance of the risks arising from it are unequal.

For historical reasons rooted in the model of colonial exploitation in force between the 16th and 20th centuries in Latin America, Africa and Asia, in which land and its natural resources were considered inexhaustible and monocultures dominated the agricultural landscape, many of today's post-colonial states have been - or rather, have remained - economic exporters of primary products. The over-exploitation of natural resources has resulted in environmental liabilities that persist in these countries.

Moreover, the emergence of climate change has made economies that were historically based on agricultural products even more vulnerable. Internally, small and medium-sized family farmers are experiencing the effects of a crisis that they have had minimal responsibility for. Externally, monoculture estates not only leave traces of land degradation and increased GHG emissions in the atmosphere but also face unfair competition due to the carbon-tainted inputs exported from underdeveloped countries. These inputs have to compete with more attractive and cheaper products that benefit from subsidy policies in the Global North<sup>52</sup>.

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<sup>51</sup> The Global Action Agenda mentions, for example, that the allocation of 1/3 of the investments currently made in research and innovation would be enough to leverage the structural transformation of the sector, which leads us to question the reasons why such investments do not advance on the agenda. It is crystal clear that the priority is to increase technology in the production sector, regardless of the nature of the agriculture practiced, whether it is low-polluting or high-polluting. For more: CLIMATESHOT. **A Global Action Agenda for Innovation in Agriculture**. [s.n.] 2021. Disponível em: [https://web.archive.nationalarchives.gov.uk/ukgwa/20230401054904/https://ukcap26.org/wp-content/uploads/2021/11/Climate\\_Shot\\_Global\\_Action\\_Agenda.pdf](https://web.archive.nationalarchives.gov.uk/ukgwa/20230401054904/https://ukcap26.org/wp-content/uploads/2021/11/Climate_Shot_Global_Action_Agenda.pdf). Acesso em 20 de mai. 2023.

<sup>52</sup> AKOLEOWO, Victoria Openif'oluwa. Climate Change And Sustainable Agriculture In Africa: A Gendered, Agrarian Philosophical Approach. **Journal Of African Studies And Sustainable Development**, v. 5, n. 3, 2022. Disponível em: <https://www.acjoi.org/index.php/jassd/article/view/2976>. Acesso em: 26 jun. 2023.



As a result, the scenario of inequalities that have lasted for centuries is being exacerbated by the climate crisis. According to the FAO, between 2008 and 2018, these impacts cost the agricultural sector in developing countries billions in lost or seriously damaged crops<sup>53</sup>. Thus, the transformation to a low-carbon agriculture and economy must be thought of in an inclusive way, with special attention to fostering resilience in the Global South, so that it does not deepen pre-existing inequalities.

Unfortunately, the sector's climate transition is still being thought about and discussed in the context of the COPs to the UNFCCC in a fragmentary and monothematic way<sup>54</sup>. In addition to (i) neglecting mechanisms to deal with the historical injustices that have shaped agriculture and access to land in the poorest countries<sup>55</sup>, (ii) ignore the fact that the agricultural sector is made up of multiple voices and agents<sup>56</sup> e (iii) underlining technological innovation approaches for mechanized agriculture prevalent in the Global North<sup>57</sup> the Parties have also failed to develop the principle of intra-generational solidarity.

International cooperation as a stage for resolving the climate crisis must recognize the heterogeneity and multiplicity of voices coming from the most diverse actors and interest groups involved in the agricultural sector, not only from the North, but also - and above all, because they have so far received little attention - from the Global South. In order to achieve this, structural transformation must give equal weight to intra-generationality. So far, as Akoleowo<sup>58</sup> denounces, the mitigation and adaptive measures

<sup>53</sup> IIAC. **COP 27: Growing roles for Agriculture and Food Security**. Disponível em: <https://blog.iica.int/en/blog/cop27-growing-roles-agriculture-and-food-security>. 2023. Acesso em 22 de mai. 2023.

<sup>54</sup> AKOLEOWO, Victoria Openif'oluwa. Climate Change And Sustainable Agriculture In Africa: A Gendered, Agrarian Philosophical Approach. **Journal Of African Studies And Sustainable Development**, v. 5, n. 3, 2022. Disponível em: <https://www.acjoi.org/index.php/jassd/article/view/2976>. Acesso em: 26 jun. 2023.

<sup>55</sup> They suggest, for example, discussing mechanisms that correct these historical asymmetries and that are subject to better clarification of the compensatory instruments provided for the Loss and Damage Fund. For more: AKOLEOWO, Victoria Openif'oluwa. Climate Change And Sustainable Agriculture In Africa: A Gendered, Agrarian Philosophical Approach. **Journal Of African Studies And Sustainable Development**, v. 5, n. 3, 2022. Disponível em: <https://www.acjoi.org/index.php/jassd/article/view/2976>. Acesso em: 26 jun. 2023.; SARKU, Rebecca; TAUZIE, Mapezie; WHITFIELD, Stephen. Making a case for just agricultural transformation in the UNFCCC: An analysis of justice in the Koronivia Joint Work on Agriculture. **Frontiers in Sustainable Food Systems**. v. 6. 2023.

<sup>56</sup> Mitigation and adaptation strategies must take into account that there is no homogeneity in the sector. This is because differentiating between small and large-scale producers indicates the possibility of more precisely channeling mitigation efforts towards those who emit a lot and adaptive efforts towards those who, while contributing little to emissions, suffer their worst effects. In short, it means giving to everyone not just according to their means, but according to their deeds. For more: AKOLEOWO, Victoria Openif'oluwa. Climate Change And Sustainable Agriculture In Africa: A Gendered, Agrarian Philosophical Approach. **Journal Of African Studies And Sustainable Development**, v. 5, n. 3, 2022. Disponível em: <https://www.acjoi.org/index.php/jassd/article/view/2976>. Acesso em: 26 jun. 2023; IIAC. **COP 27: Growing roles for Agriculture and Food Security**. Disponível em: <https://blog.iica.int/en/blog/cop27-growing-roles-agriculture-and-food-security>. 2023. Acesso em 22 de mai. 2023.

<sup>57</sup> AKOLEOWO, Victoria Openif'oluwa. Climate Change And Sustainable Agriculture In Africa: A Gendered, Agrarian Philosophical Approach. **Journal Of African Studies And Sustainable Development**, v. 5, n. 3, 2022. Disponível em: <https://www.acjoi.org/index.php/jassd/article/view/2976>. Acesso em: 26 jun. 2023

<sup>58</sup> AKOLEOWO, Victoria Openif'oluwa. Climate Change And Sustainable Agriculture In Africa: A Gendered, Agrarian Philosophical Approach. **Journal Of African Studies And Sustainable Development**, v. 5, n. 3, 2022. Disponível em: <https://www.acjoi.org/index.php/jassd/article/view/2976>. Acesso em: 26 jun. 2023

put forward in multilateral forums have favored the transtemporal notion of climate risks for future generations, typical of the agenda of the Global North (e.g. Next Generation EU<sup>59</sup>), relegating the already existing inequalities in the perception of present risks to the generations of the Global South.

It is currently the communities of the Global South, which depend on small-scale, poorly mechanized family farming, that are most affected by the harmful effects of climate change. Effects to which, after all, they have contributed little. The urgency of confronting contemporary dangers, which are the result of an unfair distribution of adaptive capacities and a history of inequalities caused by them, calls for strengthening the equity of means of transition within the same generation.

While the North is looking at the broad horizon of climate risks in time for its future generations, the South, which will also face increased risks in the future, needs agility to deal with the impacts in space for its current generations. For these and other reasons, a monothematic approach to the climate transition of agriculture in international forums, which neutralizes transfer and capacity-building mechanisms while focusing on the intergenerational dimension, violates the principle of intra-generational solidarity and deepens the historical inequalities that have constituted the Global North-South divide, now also in the climate sphere.

When it comes to the approach of justice in the climate transition of the agricultural and food systems, the UNFCCC has not given it as much attention as it has for the energy sector, for example<sup>60</sup>. As can be seen, the deliberations within the framework of the Framework Convention, as numerous COPs have shown, have favored a monothematic approach, invariably focused on technological innovation to boost the productivity and efficiency of these systems, disregarding issues relating to the justice of the transformation.

The problem is not investing efforts in innovation and technology in the sector, which are equally important, but concentrating measures on this approach. This is because, firstly, technology will not be the panacea for all the current climate impacts on agriculture, especially in the Global South where practices are still poorly mechanized, and secondly, because ignoring the "justice of the transition" factor could expose historical inequities underlying the crisis and evident in the lack of means to combat it. In

<sup>59</sup> The European Union's flagship climate and digital transition package which, with the motto "no one left behind", aims to decarbonize all economic sectors to ensure the quality of life of the next European generations. For more: MINASSA, Pedro Sampaio; MICELI, Caroline; CASTRO, Natércia Cordeiro; NIEDERMAYER, Guilherme Weiss; SILVA, Camilli Meira Santos; LEAL, Carolina Ferreira; RODRIGUES, Laís Tayná Amaral. **Green New Deal & Multilateralismo**. Rio de Janeiro: Lumen Juris. 2023a.

<sup>60</sup> SARKU, Rebecca; TAUZIE, Mapenzie; WHITFIELD, Stephen. Making a case for just agricultural transformation in the UNFCCC: An analysis of justice in the Koronivia Joint Work on Agriculture. **Frontiers in Sustainable Food Systems**. v. 6. 2023.

other words, disregarding the justice approach could result in deepening inequalities between regions and countries, since neither transition can occur "at the expense of exclusionary processes"<sup>61</sup>, nor technology transfer can reinforce the relations of domination and economic dependence that have characterized colonialism and neo-colonialism, as the basis of the persistent imbalance between the Global North and South.

## CONCLUDING REMARKS

The work was guided by the objective of explaining the binomial of agriculture and climate change under the 1988 Federal Constitution, the 2030 Agenda and the United Nations Framework Convention (UNFCCC). To this end, we used a qualitative approach and the technical tools of a bibliographical and documentary review.

The term "sustainable agriculture" represents an umbrella with the characteristics of what is meant by sustainable development. As such, it doesn't have a strict, defined model, although there are two orders in which it can be achieved: political conditions and conditions regarding the structure and intensity of production. In Brazil's constitutional order, these conditions are linked to the logic of protecting nature from the dense core of the Principle of the Dignity of the Human Person, and therefore from the process of protecting human rights (e.g. the Human Right to Adequate Food) in a system of sustainable development.

In this sense, discussions on reducing the GHGs emitted by agriculture are gaining ground, especially, in the context of this work, in the 2030 Agenda and the UNFCCC. The recognition of the need to reduce emissions highlights agriculture as an active emissions sector, while the effects and risks of the climate crisis on agricultural systems denote the vulnerability characteristics of a sector that is passive to the crisis. In other words, the agricultural sector must produce more to meet the needs of a growing global population, while emitting less and less. Therefore, it is necessary to restructure the production model, supported by the government, in a space that is conducive to the flourishing of cultural and local characteristics.

It's not enough for just a few states to pursue a climate agenda to reduce emissions, nor does it make sense for adaptive structures to be restricted to the perimeters that can afford them. The expected results are part of a common ambition, while restricting access nurtures increased inequality between colonizing states and former colonies.

What can be seen is that the deliberations at the COPs have favored discussions on

<sup>61</sup> SARKU, Rebecca; TAUZIE, Mapenzie; WHITFIELD, Stephen. Making a case for just agricultural transformation in the UNFCCC: An analysis of justice in the Koronivia Joint Work on Agriculture. **Frontiers in Sustainable Food Systems**. v. 6. 2023.

technological innovation and the efficiency of systems, disregarding the justice of restructuring. Disregarding the justice approach can result in deepening inequalities between regions and countries, since even transition cannot occur at the expense of exclusionary processes.

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**ABOUT THE AUTHORS:****Pedro Sampaio Minassa**

Formou-se em Direito pela Faculdade de Direito da Universidade Federal do Espírito Santo, Brasil, em 2019. Atualmente, está a cursar o Mestrado Científico na FDUL (Faculdade de Direito da Universidade de Lisboa), com especialização em Ciências Jurídico-Ambientais. Além disso, é bolsista CNPQ do Mestrado no Programa de Pós-Graduação em Meio Ambiente e Desenvolvimento da Universidade do Vale do Taquari (UNIVATES), Brasil.

**Guilherme Weiss Niedermayer**

Graduado do curso de Direito da Universidade do Vale do Taquari - UNIVATES (2016 - 2022). Pós-graduado em Direito Ambiental pelo CEI - Círculo de Estudos pela Internet em parceria com o Instituto Direito por um Planeta Verde e Faculdade CERS. Mestrando no Programa de Pós-Graduação em Ambiente e Desenvolvimento da UNIVATES (Conceito 5), bolsista Prosuc CAPES, modalidade I. Foi bolsista de iniciação científica da Universidade do Vale do Taquari - UNIVATES. Membro voluntário do grupo de pesquisa Justiça Ambiental ASAS: Alimentos, Saberes e Sustentabilidade

**Luciana Turatti**

Pós-doutora em Direito pela Universidade de Sevilha, Espanha (2019). Possui doutorado em Direito pela Universidade de Santa Cruz do Sul - UNISC (2014), mestrado em Direito pela Universidade de Santa Cruz do Sul - UNISC (2003) e graduação em Ciências Jurídicas e Sociais pela Universidade do Vale do Rio dos Sinos (2001). Atualmente é professora adjunta da Universidade do Vale do Taquari - Univates, onde ministra as disciplinas de Direito Constitucional e Direito Ambiental, no curso de Direito. Professora permanente do Programa de Pós-Graduação em Ambiente e Desenvolvimento - PPGAD e do Programa de Pós-Graduação em Tecnologia e Gestão Sustentáveis - PPGTecG, ambos da UNIVATES, e, também Coordenadora da Pesquisa junto à Pró-Reitoria de Pesquisa. Professora permanente do Mestrado Profissional em Rede Nacional em Gestão e regulação de recursos hídricos - ProfÁgua da UFRGS. Coordenadora do Grupo de Pesquisa em Justiça Ambiental ASAS: Alimentos, Saberes e Sustentabilidade (CNPq) e pesquisadora do grupo de pesquisas Práticas Ambientais, Comunicação, Educação e Cidadania (CNPq).

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