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# Natural resources exploitation, sustainable development and colour economies – A historical synopsis

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## Abstract

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By applying historical methods, the article examines how ancient and mediaeval authors developed the idea of the sustainable exploitation of natural and agricultural resources. Malthus, Ricardo, Marx, and their followers addressed these issues in the eighteenth and nineteenth centuries. The author argues that solving the equation of how to maintain or improve the living standards of the growing human population while intensifying the exploitation of land and natural resources is embedded in all subsequent economic, social, and political developments. Next, the article depicts the chronology of how the Sustainable Development Goals emerged and were agreed upon through a series of UN conferences and assemblies between the 1970s and 2013, when they were finally adopted. The last section epitomises various marketing concepts and links the SDGs to specific colours to increase global awareness of the exploitation of agricultural and natural resources and of how their depletion would undermine humanity's prospects.

*Keywords:* sustainable development goals; agricultural and natural resources exploitation

## Introduction and Objectives

The overexploitation of agricultural and natural resources since the Industrial Revolution has led to widespread movements and public concern about the Earth's ability to sustain the growing population over the past sixty years. The article aims, on the one hand, to offer a synopsis of how environmental movements and international organisations have interacted to agree on sustainable development goals. For this purpose, the concept of sustainability will be explored from Antiquity to modern-day developments. On the other hand, it explores the meanings and connotations of colours, as well as their application in psychology, marketing, and the labelling of the Sustainable Development Goals agreed at various United Nations fora. The author applies historical methods in the article while showing that several teams use limited or full combinations of colours to designate the different types of economies and the targeted sustainable development goals by 2030.

***Sustainability – concept development***

Why are colours used to denote the economic model to which a modern society adheres? The simple answer to this question is that colours follow the Guidelines of the Sustainable Development Goals, set by the United Nations in 2015, and aim to raise global awareness of the SDGs.

When considering this answer, it is necessary to pay attention to the issue of sustainability as a concept – its emergence, development, and broader dissemination. While Antiquity and the Middle Ages lacked a clear concept of sustainability, its definition – a policy aiming at economic growth without the depletion of natural resources and the exhaustion of soil fertility – can be found in the earliest treatises on agriculture and economics. For example, the

first manuals on land and household management, such as Hesiod's Works and Days [Ἔργα καὶ Ἡμέραι], composed c. 700 BC, Xenophon's Oeconomicus [Οἰκονομικός] (c. 430–355/354 BC), and Historia Plantarum [Περὶ φυτῶν ἱστορία] by Theophrastos of Eresus (c. 371–c. 287 BC), dealt with agricultural modes of economic development and management. Notably, Xenophon's work on household management left its mark on the modern discipline of economics via its title. Building on these early observations, later authors such as Marcus Terentius Varro (116–27 BC), Pliny the Elder (23/24–25 August 79 AD), Vindonius Anatolius Berytius (4th c. AD), and the compilers of Geoponika [Γεωπονικά] (10th c. AD) further studied the exploitation and most sustainable use of agricultural and natural resources (Christmann, 1996; Cataudella, 2002). All of them recommend improving land and achieving better harvests by using fertilizers derived from animal manure, rich in nitrogen. Despite these advancements, the low level of mediaeval grain yields, along with the Black Death and a cold period in the North Atlantic climate, decimated the population in the thirteenth and fourteenth centuries. Moving forward in history, improvements in agricultural technology, irrigation techniques, seed selection, and animal breeding, along with climate warming since the fifteenth century, resulted in the demographic boom of the sixteenth and seventeenth centuries (Sweeney, 1995). These demographic fluctuations and historical developments provoked research in eighteenth-century Europe on the causes of the rise and decline of human societies. Academics owe the definition of the sustainability issue to Thomas Malthus's work "Essay on the Principle of Population" (Malthus, 1798): The increase in food production improves the standards of living for the total population. However, the upsurge is temporary due to the population growth, which returns the level of production per capita to the one prior to the nutrition increase. In other words, until recently, humans were inclined to use an abundance of basic food resources to support population growth rather than to maintain a higher standard of living. Hence, the Malthusian trap is defined as the difference between exponential population growth and linear food production.

Indeed, sustainability in the early nineteenth century was limited to solving the problem of how to increase or maintain a higher standard of living in terms of food supply, given the population upsurge and the limited amount of agricultural land. Various economists offered a plethora of answers – the most popular being better resource allocation enabled by the comparative advantage theory (Ricardo) or a more egalitarian redistribution of property rights over the means of production, including land, and the distribution of production proceeds among industrial and agricultural workers (Marx). In the 1930s, John Maynard Keynes noted that, all else being equal, i.e. no wars and no population growth, men are destined to improve their well-being, which would result in working fewer hours than their predecessors (Keynes, 1932). Economists soon realised that not only did wars continue to torment mankind, but technological advancements in medicine and agriculture proved Malthus right regarding population growth without improvements in the standards of living for all humans.

Many literary works focused on the ecology and sustainability of human habitats in the nineteenth and twentieth centuries (Tüskés, 2019). It is no accident that some twenty-five years after World War II, and amid the broader global industrial expansion, policymakers in developed countries decided to explore the question of up to what point in time humanity could grow, given the scarcity of natural and agricultural resources.

In 1968, the Economic and Social Council (ECOSOC) of the United Nations (UN) adopted a Swedish proposal to convene a UN conference to discuss the human impact on the environment in its various dimensions. Following UN General Assembly Resolution No. 2398/1969, the countries agreed to organise an international meeting focusing on environmental issues in 1972. The governments of one hundred and fourteen countries took part in it. The United Nations Conference on the Human Environment convened in Stockholm, Sweden, between 5 and 16 June 1972. It adopted the Stockholm Declaration, which framed twenty-six principles on the environment, poverty, industrialisation, economic growth, and global pollution of agricultural land, air, water, and oceans. The Conference unanimously agreed that countries should pay closer attention to the environment and establish an organisational infrastructure of ministries and agencies (United Nations Conference on the Human Environment). As a result of these recommendations and UN General Assembly Resolution No. 2997/1972, the UN Environment Programme emerged. The European Economic Community, on the other hand, established the Environmental and Consumer Protection Directorate in 1973 to address these issues (McCormick, 1995; Schulz-Walden, 2013).

Within this institutional and political context, the Club of Rome commissioned the report Limits to Growth by Dennis Meadows and his team in 1971. The general public critically assessed its conclusions. Despite the general disagreement, the report fell well within the broader trend of raising questions about the ecological damage caused by human exploitation of the planet's natural and agricultural resources. It also raised the question of whether a sustainable model for economic development could be developed in the long run (Meadows et al., 1972).

Since the environmental goals set by the UN were not achieved, the UN organised several follow-up conferences: Rio de Janeiro (1992), also known as the Earth Summit, which agreed upon a Framework Convention on Climate Change; Johannesburg (2002); and Rio de Janeiro, aka Rio+20 (2012). Despite criticism from many UN members and obstruction from others, the countries participating in these conferences, along with all other summits of lesser significance, reached the Kyoto Protocol (1997) and the Paris Agreement (2015) on environment and climate change (DeSombre, 2006; Dodds et al., 2012).

Sustainability as a concept was brought to the forefront of environmental issues by the UN report *Our Common Future*, published in October 1987, also known as the Brundtland Report. It aimed to complement multilateral agreements that recognise the interdependence of nations and states by introducing the concept of sustainable development in the human exploitation of the planet's natural and agricultural resources. The report defined sustainable development as follows: *Sustainable development must meet the needs of the present without compromising the ability of future generations to meet their own needs* (Brundtland Commission, 1987). Following this report, the UN established a Commission on Sustainable Development within the ECOSOC (UN General Assembly Resolution A/RES/47/191). Its objective was to supervise the results of the Earth Summit organised in Rio de Janeiro in 1992. At the follow-up Rio+20 summit, it was decided to replace this body with the High-level Political Forum on Sustainable Development, which was then established in 2013. Another important outcome of Rio+20 was the agreement reached by the participating UN member states to form a working group to conceptualise the Sustainable Development Goals (United Nations Conference on Sustainable Development). The working group decided that these goals should be finite, ambitious, and easy to promote. They should cover the three dimensions of sustainable development: economic, social, and environmental, and be integrated into the UN's post-2015 agenda.

The Sustainable Development Goals (SDGs) were formulated by a thirty-member Open Working Group of UN Member States (UN General Assembly Resolution 67/555 of 22 January 2013). They were announced at the UN Summit on Sustainable Development (25–27 September 2015) held in New York. The summit set seventeen Sustainable Development Goals (SDGs). To better popularise these goals and the types of economies associated with them, the UN assigned a spectrum of colours to them. They were reaffirmed at the UN Climate Change Conference held in Paris, France, from 30 November to 12 December 2015. On 6 July 2017, the UN published a list of targets and indicators for each of the 17 SDGs to be achieved by 2030 (UN Sustainable Development Goals).

The UN agencies that are part of the UN Development Group allocated resources to organise an independent campaign to promote the SDGs globally. The campaign, named Project Everyone, attracted the support of a plethora of corporations and international organisations, including the IMF and the World Bank (UN Sustainable Development Group). A team of PR experts then proposed an icon and a colour assigned to each SDG (GUIDELINES).

***Historical and psychological aspects of colours applied to the SDGs***

When assigning colours to each SDG, the PR experts considered the historical and psychological connotations that each might have had.

Historically, gold has been associated with the sun's sacral power or royal power. It also denotes stability and prosperity associated with gold coins. The silver colour is associated with silver coins and ingots – the form in which countries and most people held the value of their savings and estates until the recent past. Brown and copper-reddish colours are associated with the lowest and most popular denomination coins – bronze or copper. Again, green can be associated not only with green pastures and wide-open lowlands, but also with the colour of the most popular paper money of the nineteenth century, i.e., the greenbacks issued by many US banks during the westward expansion of the United States. Purple has been associated recently with gender equality, although historically it was reserved for emperors and popes. Blue connotes blue skies or larger bodies of water, such as oceans, in the colouring of many countries' flags. White, and sometimes grey, refers to the colour of the elderly population.

The psychological associations of colours vary depending on sociological research and the cultural perceptions of the local population (Elliot, 2015). Conventionally, red is associated with lust, power, excitement, love, speed, and anger. Yellow is associated with competence, happiness, cheapness, and low quality. Green stands for good taste, envy, eco-friendliness, health, and money. Blue symbolises sophistication, competence, high quality, corporate structures, and reliability. Pink is perceived as a symbol of authority, but also of femininity and flirtatious behaviour. Violet or purple is often associated with warmth, sophistication, and power, as it was once restricted to kings and popes. Orange signifies ruggedness and excitement. Brown is associated with grief, while black alludes to happiness and sophistication, as well as the object's preciousness and fear. Finally, white symbolises sincerity and purity (Aslam, 2006; Palmer and Schloss, 2010; Lupton, 2017; Kauppinen-Räisänen and Jauffret, 2018).

***Approaches to colour coding and SDGs***

In response to the SDGs, three approaches emerged for colour coding present-day and 2030s economies. On the one hand, the United Nations Economists Network classified the new economies of sustainable development into eight categories with the following colouring: Green (green economy), Blue (blue economy), Light Green (circular economy), Orange (creative economy), Yellow (attention economy), Purple (care economy), Burgundy Red (social and solidarity economy), and Brown Mustard (frugal and innovation economy) ("Setting a path towards new economics for sustainable development – an overview").

On the other hand, all available materials on the UN SDG website allow us to link the SDGs to the following colours. The first UN SDG, which aims to achieve no poverty globally, is associated with the colour red. The second goal, which aims to achieve zero hunger through more advanced agriculture, is linked to the colour mustard. The third SDG is defined as the good health and wellbeing of humanity, which is associated with Kelly green. The fourth one focuses on the quality of education and is labelled with dark red. The fifth SDG addresses gender equality in red-orange colours. The next one concentrates on the human need for clean water and sanitation; hence, it is associated with bright blue. The seventh SDG, addressing the need for affordable and clean energy, is visualised in yellow.

The eighth recognises the challenge of ensuring decent work and sustainable long-term economic growth. Its colour is Burgundy Red. The next one deals with industry, innovation, and infrastructure and is associated with the orange colour. The tenth SDG emphasises reducing inequalities. Its colour is magenta. The eleventh one has been coloured golden yellow since it focuses on sustainable cities and communities. The twelfth SDG recognises the need for responsible consumption and both agricultural and industrial production. Its colour is brownish or dark mustard. The thirteenth goal relates to climate action and is coloured dark green. The next one addresses underwater life and is accordingly coloured blue. The fifteenth goal concerns life on land and is lime green. The sixteenth SDG addresses the issues of peace, justice, and the need for strong institutions. It is coloured royal blue. The final goal is to establish partnerships to fulfil the SDGs. It is coloured navy blue (United Nations Communications material, Making the SDGs Famous and Popular).

Richard Matthews offers a third approach. He distinguishes ten classes of coloured economies: brown, green, blue, golden, purple, white, silver, red, grey, and black. The author examines how different colours describe different areas of economic focus. On the one hand, he argues how each coloured economy adversely impacts or benefits the seventeen SDGs (Matthews, 2022). While the UN Economists Network's programming document examines the targets ascribed to each SDG, Matthews merges them for two reasons. Firstly, many of the SDGs tally with their targeted outcomes for 2030. Secondly, he assesses the SDGs against how each economy aligns with the three pillars of sustainable development (economic, social, and environmental).

In many instances, Matthews summarises and popularises articles published by the United Nations Development Programme (United Nations Publications). In the case of the silver economy, he follows its EU definition, namely that it is the sum of the economic activities of people over the age of 50, with a focus on their consumer behaviour and the economic activity it generates. Novelties to the colouring are the grey, black, and white economies. The former reflects tax evasion by economic agents, while the latter focuses on illegal or unauthorised economic activities, including human trafficking and the smuggling of weapons. The white economy deals with the health industry. Matthews ascertains that achieving the social development goals by 2030 requires a tailored strategy that comprises a wide range of approaches, including regional specifics. In his view, the most promising economies in fulfilling these goals are the blue, green, golden, purple, and white economies (Matthews, 2022).

## Conclusions

The article offers a synopsis of how the idea of the sustainable use of agricultural and natural resources emerged in Antiquity and has developed to the present day. Since the 1960s, the topic of sustainable development has appeared in numerous research projects and international conferences organised by various UN committees. Following their final determination in 2013, the UN Summit on Sustainable Development agreed that better marketing of the goals would raise global awareness of the exploitation of agricultural and natural resources and how their depletion would undermine the prospects of humanity. It therefore linked the SDGs to a colour-coding system that allowed for the exploration of the diversity of human economies from a novel perspective.

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***Conflict of interest***

The author declares that neither they nor the article have any conflicts of interest with any other research, research project, or funding body.

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