An Environmental History Perspective on Sustainable Economic Growth

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In recent years, there has been growing global interest in and awareness of the limitations of our ecosystems. Political and societal initiatives worldwide are emphasizing the need for a more sustainable way of living. While we have historically addressed the societal and environmental impact of humans on Earth, sustainability has often been disconnected from economic growth. The United Nations Sustainable Development Goals (SDGs) and the European Union Green Deal advocate for sustainable economic growth, but lack specific measures to achieve this goal. This discussion explores different historical events and perspectives on whether humans can achieve sustainable economic growth. An alternative viewpoint is presented by the degrowth movement, which proposes the possibility of attaining economic sustainability without growth.

1. INTRODUCTION

The environment where we live is exhaustible, it contains a limited amount of resource that we can use and exploit. The questions on how human life impact our environment is long and date at least back to the Roman Empire (Elliott, n.d., p3). However, the concerns on the impact of human activities at the global scale are more recent. Since the 1970s, we have seen an increase of political and societal interest in the topic of sustainability. In 1972, the United Nations (UN) Conference on the Human Environment held in Stockholm was a critical point, where international organizations and countries around the world started to point out the interest to move towards a sustainable development (Gutmann & Gorman, 2022, p2). During that time, we also saw the creation of the US Environmental Protection Agency (EPA) (EPA, 2022, p1), the NGO Greenpeace (Britannica, n.d., p1), and an increase in movements and protests related to environmental issues (e.g. anti-nuclear protest in the US or the Chipko movement in India) (Petruzzello, 2022, p1). The development of a sustainable world requires a pluridisciplinary approach, taking into account all possible dimensions (i.e. environmental, societal, economical). However, sustainability has been historically dissociated from economic growth. In today's era, economic growth is one of the central pillar of our society. While up to the 18th century, world economy was stagnant, today's economy is growing exponentially to levels we have never observed before (Xu & Chakraborty, 2022, p242). In 2015, the UN published the Agenda 30, including 17 Sustainable Developmental Goals (SDGs). Within the SDGs, the number 8 defend to "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all" (UN, 2015, p4/35). In line with the Agenda 30, the new European Union (EU) Green Deal, promote as well the transformation of the EU towards a sustainable and circular economic growth (EC, 2019, p7). In despite of this ambitious goals, until now and more particularly since the Industrial Revolution, economic growth has often been associated with pollution, forced labor and unsustainability. Here, we will discuss through different events in history and different points of views, the question whether economic growth can be compatible with sustainability.

2. A SILENT SPRING

Rachel Carlson's book "Silent Spring" shed light on the harmful effects of pesticides on the environment and human health (Carlson, 2002). In her book, Carlson highlighted the potential detrimental effect that the use of chemicals can have in the environment and more particularly, how industrial activity and economic growth can severely impact wildlife. The pesticide DDT that was widely use in that era, it is known as an Endocrine Disrupting Chemical (EDC), a compound capable of altering the hormonal and homeostatic system that enables to the organism to respond and communicate with its environment (Diamanti-Kandarakis et al., 2009, p294). The presence of DDT in the environment was dramatically reducing bird populations and impairing ecosystems. Carlson's book not only promoted the ban of DDT but also raised important questions and awareness regarding whether economic growth based solely on industrialization and chemical-intensive agriculture could undermine the very foundation upon which societies depend. This concept is pivotal, as concomitantly to this, the advancements on agricultural technology and R&D following the Green Revolution

has provided an important economic growth and stability as we have never seen before (Pingali, 2012, p12302). Indeed, the Green Revolution provided the tools and the technology required to increase crop yields (especially in the East) and raise the quality of life of millions. As it is obvious that nobody can predict what would have happened, in the absence of the improvements that brough the Green Revolution, it would have been likely that the world population would have increased at levels higher than the amount of available resources, as Malthus proposed. According to Malthus, population tends to grow exponentially while food production grows linearly, creating a situation where resources become insufficient to sustain the population (Stokstad, 2005, p102). While not at a global scale, we have already experienced moments in history where resources were scarce and population had to face difficult moments. For instance, the collapse of the cod fishery in Newfoundland (Canada) during the 1990s had a significant societal and human impact (Gien, 2000, 121). The depletion of fish stock resulted in the lost of economic sustain for thousands of fishermen, led to nutritional restriction and population displacements. In Sub-Saharan Africa, the excessive use of chemical fertilizers and overgrazing also led reduced agricultural productivity, food insecurity, and a scarcity of fertile land for farming (Pahalvi et al., 2021, p1). As consequence, it is worth noting that the use of fertilizers is leading over time to depletion of farmland by the loss of nutrients like phosphorus (P) in many regions of the world (Alewell et al., 2020, p2). As an alternative solution, organic agriculture has a growing interest in our society. The use of a sustainable agriculture may, definitely, be a major perspective to achieve a sustainable economic growth. However, there is no panacea when we take into account the global scale. While more sustainable in most domains (i.e. reduction of pollution, soil degradation), to sustain the needs of the current world population, organic agriculture needs larger areas cultivated and more labor, impacting deforestation and biodiversity worldwide (Muller et al., 2017, p3). As we have seen, the technological advancements of the last centuries have led at the same time to improvements in quality of life -and so the social and economic pillar- and a degradation on the environment. This environmental impact has been very severe in some circumstances and more subtle and constant in others. The Seveso accident of 1976 and the Bhopal catastrophe of 1984 are two examples of the severe impact that industrialization and the mass production of fertilizers have had on the environment and society (Britannica, 2022, p1; Centemeri et al., 2010). In these two events, an industrial accident led to the spill of large amounts of the pesticides and herbicides that they produced into the environment. As a consequence, surrounding wildlife and humans were heavily and deadly impacted. As a more subtle event, we can cite the chemical runoff from agricultural activity polluting water sources around the world. To conclude this section, the question remains whether economic growth can be successfully accompanied by a sustainable development, respecting thus all pillars from our society.

3. A CIRCULAR ECONOMY

The discovery of the Second Earth was one of the major factors leading to the impression that the world resources were unlimited. Exploitation of America's resources lead to the development of the Occidental economy and contributed to the onset of the Industrial Revolution (Wobster, 2016, p140). Technological advancements during the last centuries have brough incommensurable improvements in our quality of life, such as reducing diseases and increasing life expectancy. However, these advancements have also be associated to an increase in waste, in air, water and soil pollution and environmental degradation. To counteract this, it is only in our recent era, that policy initiatives are raising to protect our environment.

At the European level, the current piece of legislation promoting sustainability, the EU Green Deal, propose as a solution toward an economic and sustainable growth the use of a society based on circular economy (EC, 2019, p7). In opposition to the mainstream linear economy, a circular economy promotes the use of resources as long as possible and minimizing waste. Circular economy may not have been defined until recently but ancient populations already applied some of these principles. An agriculture based on crop rotation, to allow closing nutrient loops (White, 1970, p1); repair and recycling and even water management systems are examples of that. Indeed, Persian qanat systems allowed to capture and redistribute water in underground tunnels to be reused for agricultural purposes (Mousazadeh et al., 2023, p14).

The modern challenge relies on how to develop a circular economy in a wide, interconnected and globalized society. In the past, societies worked more sustainably by having localized economies, reducing waste and being resource efficient. In contrast, today's Industries adopt instead non-sustainable and manmade chemicals (e.g. pesticides) and materials (e.g. plastics) as a path toward progress. It is then worth looking back in history, which materials some of our ancient civilizations used and how in order to scale it up to our modern times in order to live more sustainably. For instance, the use of steel account today for 22% of the EU industrial carbon dioxide (Climate Bonds Initiative, 2022, p2). The 90% of these emissions are caused by the process of steel production, which requires to convert coal to coke by heating at high pressure/temperatures. Interestingly, steel is 100% recyclable and can easily be converted to integrate the circular economy principle. The transformation of the steel industry by recycling waste would contribute to a reduction of 58% of carbon dioxide emissions related to steel production (Climate Bonds Initiative, 2022, p8). Cases of steel recycling has already been observed widely in the past, specially in times of shortage. For instance, during the 2nd World War, governments and local authorities urged the population to provide scrap metal and other materials to be recycled to contribute to the War (Rockoff, 2000, p1). Collection points were made available and citizens contributed to the mission. Other more ancient examples of circular economy may include the recycling of construction materials in the Roman Empire (Fleming, 2020, p404) or the complex waste-disposal system of the Indus Valley Civilization (Singh et al., 2019, p 2195).

The achievement of a circular economy in a certain society is highly related to the patterns of consumption from its population. In turn, consumption and production are linked to economic growth. Prior to the Industrial Revolution, when growth rates were low, consumption habits were primarily centered on basic needs. Rapidly after industrialization, increased good availability led to the rise of the middle class and to consumer demand. During the 1950s and the 1960s, the so-called Golden Age, the Gross Domestic Product (GDP) of developed and Third World countries rose rapidly (Xu & Chakraborty, 2022, p249). The American hegemony during this time, leaded by the Dollar and a capitalist economic model, further contributed to increase consumption. The pursuit of economic growth, driven by the GDP as a measure of success, has prioritized production and consumption over sustainability and resource efficiency. Similar

patterns can be observed today as a legacy of neoliberal policies during decades (Bleys, 2011, p355). This culture, perpetuated by advertising and societal norms, has been deeply embedded in many societies and is often associated with individual status and happiness. These factors make the current economic model complex to adapt or replace. However, with growing concerns about environmental degradation, resource depletion, and waste generation, there has been a growing recognition and awareness of the need for a transition to a circular economy also within our society, and more particularly since the 1970s. Additionally, policy interventions are necessary to create an environment for a circular economy. While the EU Green Deal and the UN Agenda 30 provides important guidelines for the achievement of these goals, they are also non-binding pieces of legislation (UN, 2015, p4/35; EC, 2019, p7). Historically, many ambitious international propositions have been made but they have led to a real minor environmental and societal impact. This was the case for the principles from 'Our Common Future" published in 1987 by the Brundtland Comission (Brundtland, 1987), the Agenda 21 proposed at the Rio Earth Summit of 1992 (UNCED, 1992) or the "Millenimum Development Goals" adopted in 2000 following the Rio+5 conference in New York. Very few international policies have had a considerable impact on the defense of the environment and on sustainability. One example is the Montreal Protocol (1987), an international agreement that allowed to successfully reduce ozone-depleting substances, such as chlorofluorocarbons and hydrochlorofluorocarbons. This agreement significantly allowed to recover the ozone layer. Other examples include the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 975) and the Convention on Biological Diversity (CBD, 1992).

4. MOVING TOWARDS ECONOMIC SUSTAINABILITY... WITHOUT GROWTH?

The debate on whether capital accumulation is compatible or not with economic growth is increasing. Donella Meadows et al. (1972) provided important insight on the topic on his book "Limits to Growth" (Meadows, 1972), arguing that industrialization and economic growth driven by exponential increases in production and consumption are unsustainable and that the pursuit of continuous growth in a finite system will eventually lead to a collapse or decline of our system. They emphasize the importance of proactive planning and policy changes to avoid future crises. Under this hypothesis, economic growth is not compatible with sustainability, at least at a global scale.

Current economic growth is heavily based on the GDP index, which may not be ideal when considering as well the societal and environmental pillars (Bleys, 2011, p355). The GDP appeared in the 1930s, during the US Great Depression and became a standard metric for assessing economic progress following the 2nd World War. The GDP have a limited scope, organized excluvely on production and consumption of goods and other market-related economic activities. The GDP do not account then for factors related to environmental issues, to unsustainable economic activities, to income inequality or forced labor. GDP has been adopted without considering the long-term impact for the society, our well-being and the environment. For these reasons, alternative indicators that provides a more comprehensive understanding on progress as a whole are being adopted. One of these examples is the Genuine Progress Indicator or GPI, allowing to measure the well-being of a nation considering both the social and environmental pillars as well (Bleys, 2011, p357). Under this indicator -that has also been criticized and display important limitations-, while we have seen a growth in the US GDP towards the last decades, the GPI has remained stagnant.

As an alternative to economic growth -or at least to make it be more align with our desire for environmental sutainability-, a recent movement is gaining weight on the debate, the degrowth movement. Degrowth propose purposefully slow things down in order to minimize harm to humans and earth systems (Kallis et al., 2020, p3). In the book "The Case for Degrowth", Giorgos Kallis argues "Neither the exploitation of humans and natural resources, nor the generation of emissions and other waste, can continue to increase without exacerbating planetary crises. In Europe and North America, from where we write, sustaining growth is no longer economically sound: its social, ecological, and personal costs exceed its benefits. This condition is camouflaged by mechanisms that conceal social and ecological costs, externalizing them from accounting records, and that displace damages toward other places and people, including future generations." (Kallis et al., 2020, p1). Accordingly, following his argument, economic sustainability is not sound as far as we think of it globally and we take into account the current economic paradigm based on production and consumerism. Indeed, in the current patterns of consumption, replacing fossil fuels by green alternatives is no suitable as far as we are exceeding the planetary limits. Additionally, current movement towards alternatives in energy or products, such as solar panels or electric cars also exceed -or rather will exceed- the amount of rare metals (e.g. cobalt) that we can use from the planet, contribute to destroy landscapes and pollute oceans and rivers. Also, these activities do not solve a major environmental problem, the fret maritime transportation. According to this, the scope of a solution as the degrowth movement propose, may require to produce and consume less and differently (Kallis et al., 2020, p5). Specifically, by (1) diminishing caps on resource use, emissions and pollution, (2) promote an ecological tax reform, (3) Reduce chemical production

and use, industrial fishing activities, (4) abolishing fossil fuel subsidies, (5) democratizing and decentralizing money, (6) institutionalizing artisanal, subsistence organic farming or (7) developing networks and cooperatives (see Fitzpatrick et al, 2022, Annex 1, for a systematic mapping of degrowth measures). Interestingly, one of the major concepts on the degrowth movement is to reclaim the Commons and to restrict capitalism and, thus, capital accumulation. In the book "Before the UN Sustainable Development Goals", Xu & Chakraborty explain that while capitalism has helped to maintain capital accumulation, it has not been clearly stablished that laissez-faire policies, free markets and secured private property has led us to the current situation. Indeed, the authors state that economic growth has been observed in moments in history when governments -either capitalists or communists- has invested and made radical changes in their countries. For instance, the major land reforms implemented by the Chinese Communist Part have had a major impact in their growth (Xu & Chakraborty, p245). It is however clear that tax reforms in environmental issues will help to discourage economic activities that generate waste, pollution and inequalities. In Norway and Sweden, environmental tax reforms during the 1990s targeting carbon emissions, landfill waste, and hazardous substances had a positive impact in the environment (Shmelev & Speck, 2018). In addition, the additional use of dividends allowed to promote a decrease in other taxes and reduce inequality. Similar systems may require to be implemented at the international level to have an effective

impact in the environment.

The development -or the reclaim- of the Commons needs to recognize the importance of valuing shared resources and find ways to manage them collectively. In the "Tragedy of the Commons", Hardin explained that individuals acting in their self-interests deplete or degrade a shared resource, as a land, leading to its eventual collapse. As stated before, the degrowth movement promote to reclaim the Commons and to build ecovillages, housing cooperatives and develop non-profit activities (Fitzpatrick et al, 2022, p6). It is clear that, at a local scale, the construction of these activities can be self-sufficient and sustainable environmentally, economically and socially. Scaling down economic activity's incentives community connections. Although, based on Hardin's hypothesis developing the commons is not sustainable through time, his theory has been criticized. Indeed, preventing overconsumption of the resources may be prevented by regulating the days and times a resource can be used or by educating and raising awareness (Spiliakos, 2019, p1). At the global scale, reclaiming the Commons and reducing activities non-sustainable for our environment is more complex and required International cooperation. As an example, overfishing is one of the major current threats for the seas. This particular example is critical, as High Seas can be considered as a Common resource that belong to no nation. As a wind of hope, the United Nations has issue in March 2023 a new Treaty to protect High Seas marine life (UN, 2023). The protection of the High Seas Commons is critical to conserve biodiversity worldwide and reduce the impact of human activities on this Common good.

5. CONCLUSIONS

Here, we have discussed how history and different historic movements can help us to better understand how to a achieve a sustainable economic growth. Technological advancements have definitely brough improvements for our well-being. At the same time, these same improvements have contributed to degradation our environment to levels we have never seen before. We are seeing a growing interest in developing ways to move towards a circular economy. Our society is currently using science as never before to assess the impact of our pattern of consumption. This is the case of the Life Cycle Assessment techniques, increasingly being adopted in European Industries. Although this increasing interest on sustainability may help to reduce carbon emissions and degrade the environment, it may not be sufficient. Somme authors argue that economic growth is not compatible with sustainability. The so-called degrowth movement propose to implement measurements, such as a universal income, or to reclaim the Commons in order to achieve this goal. A remaining issue is whether this can be scale up to a global scale. As a movement centered in European and occidental developed countries, it remains questioned how these measurements can be also applied to developing countries.

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