
The Post-Pandemic Development of the Green Circular Economy and the Declarations Made During the UN Climate Change Conference (COP26) as Security Determinants

Submitted 18/09/21, 1st revision 11/10/21, 2nd revision 07/11/21, accepted 25/11/21

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Abstract:

Purpose: The aim of this article is to describe the important security determinants of post-pandemic development of the green circular economy in the context of the latest report of the Intergovernmental Panel on Climate Change (IPCC) I IPCC Working Group, "Climate Change 2021: the Physical Science Basis" and declarations made during the UN Climate Change Conference (COP26) in Glasgow in early November 2021.

Approach/Methodology/Design: The main research methodology was based on the analysis of the results of scientific research and a synthetic description of the key conclusions drawn from the review of the literature describing various aspects of the analyzed issues concerning the determinants of the climate change process, the issue of green economy development, the implementation of the principles of sustainable economic development, reduction of greenhouse gas emissions and how they impact security aspects etc. Research methods used in the study included critical literature review, comparative analysis, and analysis of available data.

Findings: The analysis of scientific data shows that the process of climate change has entered a strong upward trend and perhaps humanity has little effect on reversing this process in this century. The transformation of the environment into the economy should include, first of all, the energy sector through the development of renewable energy sources, the development of electromobility, ecological agriculture, improvement of waste segregation techniques, recycling, etc. A key issue in this process is the pursuit of sustainability. The factual implementation of the aforementioned shall enable to address the security threats that are largely intensified by climate change and lack of efficient level of sustainable development. The aforementioned shall be helpful in providing the necessary level of security and address the threats.

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Practical Implications: *In order to slow down the progressing global warming process, and tame global security threats related to climate change it absolutely is necessary to reduce all or most of greenhouse gas emissions in the shortest possible time, reform the energy sector with the respect to energy security, implement eco-innovations and carry out other pro-environmental reforms as well as to increase the scale of achieving sustainable development goals implemented in accordance with the principles of a sustainable, green circular economy. The global socio-economic crisis caused by the development of the SARS-CoV-2 (Covid-19) coronavirus pandemic should significantly change the pro-ecological awareness of people and the need to implement sustainable development in economic processes and everyday functioning of people. The need to continue the policy of reducing greenhouse gas emissions was discussed during the UN Climate Conference COP26 in early November 2021.*

Originality/Value: *For the purposes of this article, a multifaceted, synthetic and critical analysis of data available in the source literature was carried out. The proposed solutions are to contribute to a significant reduction in greenhouse gas emissions and slow down the process of global warming, and to reduce the scale of the drastic effects of climate change over the next several decades. This shall also lead to decrease of conflicts that otherwise would resource from global instabilities caused by climate change consequences.*

Keywords: *Security, climate change related threats, pro-environmental transformation of the economy, circular economy, sustainable development goals, COP26, Covid-19.*

JEL classification: *Q01, Q20, Q28, Q32, Q42, Q53, Q57, O10, O44, F02, F52, H56.*

Paper Type: *Research article.*

1. Introduction

Climate change related security threats are becoming of growing importance. Although the problems were addressed during the latest UN Climate Conference (COP26) in Glasgow, Scotland - October 31 to November 12, 2021, (*Glasgow Climate Change Conference – October-November 2021, 2021*), they were the subjects of discussions for many years (An IPCC Special Report global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, 2018), (An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, 2019).

Still the latest - 26th Climate Conference of the Conference of the Parties (COP26) organized by the United Nations Framework Convention on Climate Change (UNFCCC) summarizes many of the threats and provides the newest data. In the context of the debates and discussions held during this Climate Conference, a key question arises: Will humanity in the current 21st century manage to limit the average level of temperature increase to only 1.5 degrees C. This is a strategic goal of the development of civilization, but not achievable at the current rate greenhouse gas emissions. And only by achieving this goal will it be possible to save the planet

from a climate catastrophe, the risk of which at the end of the 21st century is constantly increasing.

Will the UN Climate Change Conference (COP26) in Glasgow, Scotland still be just another meeting with conclusions that cannot be executed or will the binding provisions be made and implemented on the necessary acceleration of the process of reducing greenhouse gas emissions aimed at slowing down the process of global warming and saving the planet's climate and biosphere, ensuring possible conditions?

The future of the next generations on our planet is in our hands. This issue will be factually clarified and verified soon. All of the aforementioned reports agree upon one thing - ongoing policies and actions are aimed at reduction of greenhouse gas emissions and global warming effects limitation are not efficient enough.

There is no more time to wait - the changes ought to be made immediately to the way people use natural resources including every expression of human activities on individual and common level - starting from a human being finishing on global community referring to states and international organizations or transnational corporations. Our existence is secondary to the existence and functioning of our planet.

As stated in one of the IPCC Special Reports, if the arising problems are not taken under consideration and taken care of efficiently they will grow and cause other threats to arise. More and more experts agree that climate change is one of the most pervasive global threats to peace and security in the 21st century (Vivekananda, 2016). The most important threats were listed in the text of Intergovernmental Panel on Climate Change (IPCC), Climate Change 2014: Impacts, Adaptation and Vulnerability, among them are:

1. extreme weather events and disasters,
2. volatile prices and provision of food
3. trans-boundary water management
4. increase of conflicts and livelihood insecurity and illegal and uncontrolled migration,
5. sea-level rise and coastal degradation,
6. unintended effects of climate policies adaptation and mitigation (Intergovernmental Panel on Climate Change, 2014).

The future of the next generations and the level of loss of biodiversity of natural ecosystems that still function on our planet Earth depend on this. The Intergovernmental Panel on Climate Change (IPCC) also took part in the above-mentioned COP26 Climate Conference. On November 4, IPCC experts presented the results of the latest report of the Working Group I entitled Climate Change 2021: The Physical Science Basis (published August 9, 2021) at a special event co-

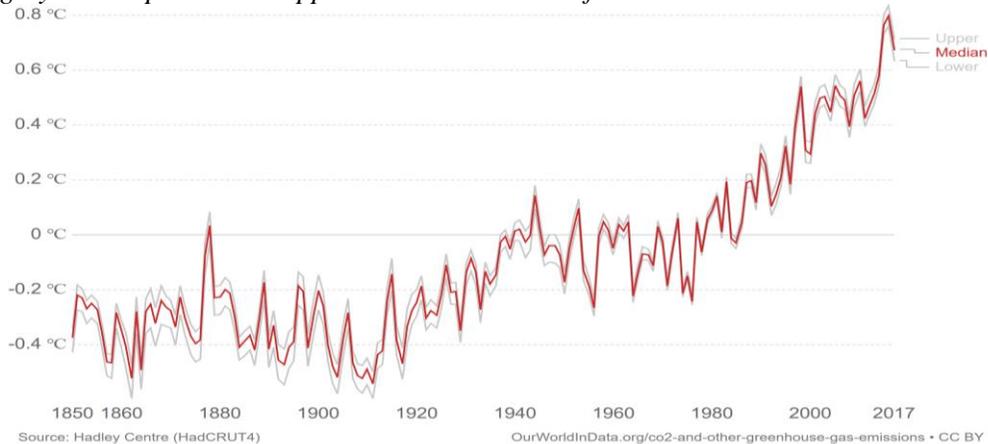
organized with the UNFCCC Subsidiary Body for Science and Technology Advice (SBSTA) (*AR6 Climate Change 2021: The Physical Science Basis. IPCC Sixth Assessment Report, Intergovernmental Panel on Climate Change (IPCC), August 9, 2021*). The Intergovernmental Panel on Climate Change (IPCC) is a UN body that analyses and evaluates the results of scientific work on climate change. The IPCC was established by the United Nations Environment Program (UNEP) and the World Meteorological Organization (WMO) in 1988. The main purpose of the IPCC is to provide political leaders with periodic scientific assessments of ongoing and prospective climate change, its impacts and threats, and also proposing adaptation and mitigation strategies. In 1988, the UN General Assembly supported the efforts of WMO and UNEP to jointly establish the IPCC, which currently has 195 member states.

According to the latest report of the Intergovernmental Panel on Climate Change (IPCC) published on August 9, 2021, many of the changes observed in the climate are unprecedented for the last thousands or hundreds of thousands of years. Such long-term changes include, among others, continuous sea level rise. On the other hand, reducing emissions of carbon dioxide (CO₂) and other greenhouse gases would limit the climate change that is already taking place. With a significant reduction in greenhouse gas emissions, the benefits to air quality can emerge quickly. However, according to the IPCC Working Group I Report, "Climate Change 2021: the Physical Science Basis", it may take 20-30 years before the global temperature stabilizes permanently. The said Climate Change 2021: the Physical Science Basis was approved at the end of July by 195 member governments of the IPCC (*Climate change widespread, rapid, and intensifying – IPCC. IPCC Sixth Assessment Report, Intergovernmental Panel on Climate Change (IPCC), August 9, 2021*).

During the G20 Summit (October 31, 2021), preceding COP26, the target of reducing CO₂ emissions was adjusted in such a manner so the increase in temperature would only amount to 1.5 degrees Celsius in 21st century. The goal was established with the respect to the conclusions of the Report of the 1st IPCC Working Group, "Climate Change 2021: the Physical Science Basis". This target, is unfortunately not achievable at the current rate of greenhouse gases emissions. At the same time our civilization has to aim at achieving it in order to survive. Otherwise the mankind will not be able to avoid a climate catastrophe scenario to happen. Everyday "conducting business as usual" upon the old rules brings us closer to collapse. Will the COP26 be a turning point slow down the process of global warming to save the planet's climate and biosphere, ensure conditions for possible existence of future generations on our planet. If this strategic goal is not achieved and greenhouse gas emissions in the following years remain at the present level, the average temperature of the atmosphere will increase by at least 2.7 degrees C by the end of the current twenty-first century, and if it grows, it will significantly exceed 5 degrees C.

In case this negative scenario is realized, then many coastal cities, agglomerations will be flooded by seas and oceans, periods of heat with record high temperatures will last many times longer per year, the number of forest fires will increase many times, most farmlands will cease to function due to permanent drought, the scale of weather anomalies will increase many times, there will be new negative effects of the global warming process, which will cause a climate catastrophe at the end of the current 21st century. To save the sustainable climate and biosphere of the planet Earth, it is crucial to carefully select and implement accordingly our activities of the 20s of the 21st century (*UN Secretary-General: COP26 Must Keep 1.5 Degrees Celsius Goal Alive, Website: "United Nations Climate Change", 31 Oct - 12 Nov 2021*) (Figure 1).

Figure 1. Average global temperature increase from 1961-1990 in degrees Celsius ($^{\circ}\text{C}$). The red line represents the median of the mean temperature change and the grey lines represent the upper and lower 95% confidence intervals.



Source: Ritchie H., Roser M. (2020). *CO2 and other Greenhouse Gas Emissions*. Internet portal "Our World in Data", 11. 2020, (<https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions>), after: Hadley Center (HadCRUT4).

It is important to bear in mind, that the outcome of the G20 Summit included setting the reducing CO₂ emissions target to keep 21st century temperature increase at 1.5 degrees Celsius. Based on scientific research and predictive models, the most probable estimation is of 2.7 degrees Celsius (assuming that if all the previous COP climate summits are implemented). Therefore, it is necessary to urgently create further ecological innovations to diminish greenhouse gas emissions and capture CO₂ from the atmosphere to secure the maximum temperature rise by 1.5 degrees Celsius as required.

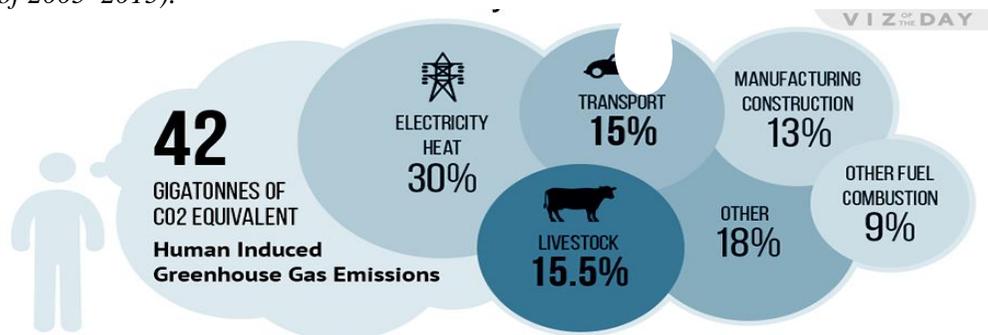
There is a question: whether the aforementioned goals are achievable? It is important to bear in mind that until now, 2021, the temperature of the atmosphere has increased by 1.1 degrees Celsius compared to the pre-industrial era. One has to remember that it is important to remember how the most developed states like the

US and also developing countries, especially BRIC members, are approaching emissions reduction (Ritchie, 2020).

The research carried out with the use of climate forecasting models shows that the temperature of the atmosphere will increase between 2.7 and 2.8 degrees Celsius, even if we comply with all the provisions so far, it is too much. It is necessary to create further ecological innovations and capture CO₂ from the atmosphere so that the atmosphere temperature increase in at the end of this century amounts to 1.5 degrees C. Thus, it is necessary to urgently create and implement new pro-environmental innovations and ecological technologies, thanks to which the green the transformation of the energy sector will be fully accomplished during the present decade of the 2020s.

Only in this way, the increase in the temperature of the atmosphere on the current growth path, estimated at about 2.7 - 2.8 degrees C at the end of the 21st century, could be significantly reduced and enables to avoid a global climate crisis (Figure 2).

Figure 2. Emissions of Greenhouse Gases by Sectors (annual emission in the period of 2005–2015).



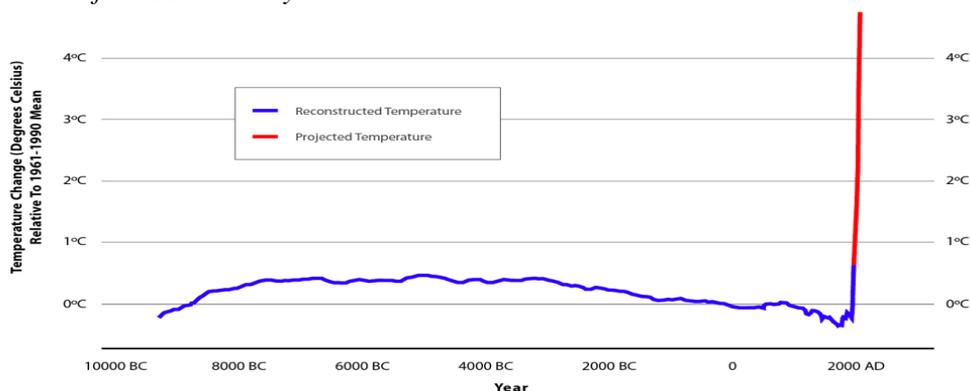
Source: Global Greenhouse Gas Emissions from Livestock, (in:) “Knoema.com” website, Data Driven, August 1, 2016, (<https://knoema.com/infographics/maodxhb/global-greenhouse-gas-emissions-from-livestock>), for: Report by the Food and Agriculture Organization, EDGAR, World Resources Institute.

In view of the above, the findings, declarations and commitments made during the COP26 will prove very important for the future of our planet Earth, in particular, climate change and the state of the biosphere. Unfortunately, still not every country declared that they will achieve zero emissions by 2050, and to achieve the goals more engagement is needed. Importantly, settling the deadline for year 2050 is not enough, change has to be done earlier, otherwise keeping the temperature rise at 1.5 degrees C by the end of the 21st century will be not possible. Instead the average temperature of the atmosphere might rise to the level of 2.7-2.8 degrees Celsius. This change will equals a catastrophic, multiple, increase in number and scale of droughts, forest fires, combined with a decrease in the area of farmlands suitable for agricultural crops, permanent heat, an increase in the scale of weather anomalies,

tornadoes etc. Much faster and decisive action is needed. Therefore the year 2050 is definitely too late to save the climate and biosphere of planet Earth, additionally, some countries plan to achieve zero emission in terms of greenhouse gases in 2060 or 2070. In order to save the climate and biosphere of planet Earth from catastrophic degradation, it is necessary to carry out a pro-environmental transformation of the economy, including a pro-environmental transformation of the energy sector in the current decade, by 2030 at the latest.

Therefore, many issues and goals that COP26 addressed do not differ significantly from the corresponding COP climate conferences that took place earlier. Unfortunately, there is a high risk that hopes of people thinking about the future of the climate and biosphere of planet Earth are not fulfilled once again (*Greater Ambition Now Critical as UN Climate Change Conference Opens, Website: "United Nations Climate Change", 31 Oct - 12 Nov 2021*) (Figure 3).

Figure 3. Global warming. Earth temperature change in the years: 10,000 BC - 2000 AD and a forecast of an increase in the average temperature on the Earth at the end of the 21st century.



Source: *Science & ClimateProgress.org*

In a declaration that was made at the aforementioned UN Climate Conference COP26, participating Countries committed themselves to end the deforestation process by 2030. The question arises as to why only now this decision was taken, since it has long been known that forests absorb about 1/3 of the CO₂ emitted to the atmosphere on a global scale. Another important questions follow the first one: why only in 2030 and not now? Why can the deforestation process not be turned towards afforestation?

The programs for afforestation of wastelands and post-industrial areas, degraded by civilization, etc., applied in some countries, are largely responsible for reducing the scale of the amount of CO₂ accumulating in the atmosphere, which is emitted by human activities, mainly energy sector based on the combustion of fossil fuels, automotive and generally transport sector powered by combustion engines, some

industrial production processes, livestock farming, burning forests, etc. Therefore, the processes of deforestation of green areas, natural forest ecosystems, natural forest complexes should be completely stopped as of now. The deforestation process should be changed to an afforestation process as soon as possible, if not now.

If the rate of greenhouse gas emissions is slowed down too slowly and the process of reducing CO₂ emissions continues for many years, it will not be possible to stop the increase in the average temperature of the atmosphere at the level of 1.5 degrees Celsius difference between the period before the first industrial revolution and the end of XXI century. It is to be hoped that during COP26 will be made declarations that finally prove that the seriousness of the problems is understood and addressed to the level required by the whole planet and the mankind - not the businesses and transnational corporation needs.

The future of climate change, the condition of the biosphere and the living conditions of the next generations of people depend on it. If the whole planet ecosystem collapses there will not be any market and consumers to compete over, the human resources will not be available anymore, the citizens will die or fight for survival and there will be no one to pay the taxes or go vote - what more shall happen in order for multinational companies and governments to understand? Therefore, it is also an important issue in limiting the scale of the reduction in biodiversity of the natural ecosystems of the planet Earth in the current 21st century (Figure 4).

Figure 4. Deforestation of forests on planet Earth in 1990-2015.



Source: Joest A. (2020) *Bamboo, the super plant for community empowerment, to combat the effects of climate change and greener production chains* (in:) "AnnJoest.com" website, *System Innovation for Sustainable Development*, (<https://annjoest.com/bamboo-the-super-plant-for-community-empowerment-to-combat-the-effects-of-climate-change-and-greener-production-chains>).

One of the key elements of reducing the level of CO₂ in the atmosphere is the cessation of the ongoing large-scale deforestation and the reversal of this process towards the development of afforestation programs for civilization degraded areas, post-industrial areas, open-cast mines, wastelands with sterile soil, etc. Within 1 hour 27 football fields are cleared of forests on a global scale. The deadline of 2030

to stop deforestation of natural forest ecosystems is a term that is far too distant! Today, Europe is the only continent where forests are growing. It is therefore necessary to urgently stop the deforestation processes and reverse this unfavourable trend on all continents. During COP26, there was also a declaration of emission reduction, in addition to CO₂, also of methane, the emission of which into the atmosphere causes several times faster generation of the greenhouse effect compared to CO₂.

Another important point that should be implemented much earlier. But better late than never. In addition, it is necessary to create, develop and implement pro-environmental technologies and green, ecological innovations, thanks to which the process of pro-environmental transformation of the economy will be carried out more efficiently and in a much shorter period compared to the current plans and declarations (*COP26: Global Innovation Hub Launched for Transformative Climate Solutions, Website: "United Nations Climate Change", 31 Oct - 12 Nov 2021*).

2. The Scope and Methods of Research

It is apparent that the issue of the post-pandemic development of the green circular economy and the declarations made during the UN Climate Conference (COP26) are becoming more and more apparent. However, problems arise when it comes to the implementation of the goals that has been developed during the previous Climate Conferences. Therefore, the subject of research was the security determinants of the post-pandemic development of the green circular economy and the declarations made during the UN Climate Conference (COP26).

The main research question of this paper is: What are the security determinants of the post-pandemic development of the green circular economy and the declarations made during the UN Climate Conference (COP26)?

Therefore, the aim of this paper is to characterize them with the respect to general goals (Sustainable Development Goals) stated by the UN with the respect to climate change and the outcome of the COP26 and what has to be done in order to develop green circular economy so the efficient level of security is provided.

The paper also aims to present proposals for changes that should take place so that the post-pandemic development of the green circular economy and the declarations made during the UN Climate Conference (COP26) could be executed in a way our planet can survive.

The main hypothesis refers to the assumption that the post-pandemic development of the green circular economy and the declarations made during the UN Climate Conference (COP26) might be executed to a limited extent, because generally the problem of climate change and its security implications are not fully understand.

Only some countries declare that they will achieve zero emissions by 2050, therefore more engagement is needed to keep the temperature rise at 1.5 degrees C by the end of the 21st century. Instead, without immediate reaction the average temperature of the atmosphere might rise to the level of 2.7-2.8 degrees Celsius. The rise of that amount will result in a catastrophic, multiple, increase in number and scale of extreme weather events and disasters - droughts, forest fires, combined with a decrease in the area of farmlands suitable for agricultural crops, permanent heat, an increase in the scale of weather anomalies, tornadoes etc. Following security threats will arise, in particular, volatile prices and provision of food, problem with access to water, increase of conflicts and livelihood insecurity and illegal and uncontrolled migration, etc. (Intergovernmental Panel on Climate Change, 2014).

For the appropriate addressing the threats it is a necessity to take the steps now, that is the only way to rescue our planet. The main theoretical method of research is the analysis of sources, including legal acts and literature. This research enables to combine several disciplines, security studies, economy and law. Authors use the various methods i.e. synthesis, deduction and reduction to extract and merge the results.

Simultaneously, Authors focus upon use of the research methods synthesis to develop applications and proposals for solutions. Conceptual analysis and criticism of information presented in the sources have great impact upon this work. The analysis as a research method allowed Authors to indicate the changes that took place in terms of the approach toward the climate change problems and securitisation of climate change.

Importantly, since the Authors decided to use of the analysis method, logical and cause-effect construction, as well as the methods of generalization and abstraction, deductive and reductive inference it was possible to indicate repeatable features, eliminate irrelevant features, and find specific dependencies about the research problem.

Conclusions that have arrived during the research thanks to the aforementioned methods made it possible to separate and consolidate the results obtained. Therefore the proposal of conceptual solutions indicating the most important threats and possibilities to avoid them was prepared.

3. Growing Importance of the Implementation of the Goals of Sustainable Development and Pro-Environmental Transformation of the Economy as a Key to Increase Security

Blaise Pascal stated, "Man is only a reed, the faintest in nature, but a thinking reed." It's been a while now that these words were spoken. There was technical progress thanks to which man was able to adapt to life in various conditions. Until recently, it seemed that we can continue our growth and consumption for many years, even

generations to come. However, the progressing process of global warming made it necessary to verify the previously dominant views on the role of man and the development of civilization in the context of the natural environment.

At present, these words of Blaise Pascal have become very relevant again. Crisis events of this type, such as the current pandemic, make man realize his fragility towards the forces of nature. People realize that man's responsibility towards nature is very great. The development of civilization caused an imbalance in natural ecosystems. The number of species of flora and fauna decreases quickly from year to year. The biodiversity of biological ecosystems is diminishing (Kehoe, Romero-Muñoz, Polaina, Estes, Kreft, and Kuemmerle, 2017). The adverse effects of climate change in the form of droughts, floods and others appear more and more often (Adapting to Climate Change: How Ready is Your Country? 2020). In 2019, the greatest number of forest fires occurred. Since the end of the 19th century, the average temperature of the atmosphere at the Earth's surface has been gradually increasing. Environmental pollution is increasing. Pollution of the environment with plastic has increased particularly rapidly in recent years.

Bearing the aforementioned in mind, it is important to follow the general tendencies in consumerism and good production. Smil (2019) stated "In relative terms (per unit of economic product) the global economy has shifted in the direction of greater sustainability but in absolute terms it has shown no tendency toward deliberately slower growth, and degrowth remains a cherished topic for ecological economists, not a guiding principle for any companies or governments. As a result, we can only speculate when and how we might be able to put an end to material growth and forge a new society that would survive without worshipping the impossible god of continuously increasing consumption: no country has committed to following such a path" (Smil, 2019).

While taking under consideration the security threats that come with the climate change - one would agree easily that right now is the good moment to focus upon survival of the mankind and the planet instead of estimating the future economic growth or fearing decrease of consumption/markets.

Many research results in the field of climatology and ecology confirm the accelerating greenhouse gas emissions in recent years, which causes the accelerating process of global warming. With each successive year there are more and more examples of the growing scale of imbalances in nature caused by the development of human civilization. Therefore, human responsibility for the state of nature on planet Earth is very great. Sustainability (Goodland, 1995) and biodiversity are the greatest achievements in the evolution of life on planet Earth. High biodiversity of life forms, including ecologically cooperating different forms of life of flora, fauna, fungi and microorganisms creates the sustainability of natural ecosystems adapted to specific climatic, geological, etc. conditions (Le Saout, Hoffmann, Shi, Hughes, Bernard, Brooks, Bertzky, Butchart, Stuart, Badman, and Rodrigues 2013).

The role of the man of the 21st century, who appreciates these resources and the achievements of nature, is to protect natural biodiversity and strive for sustainability (Gołębiowska, 2015; Prokopowicz, 2020a). The more and more frequent climatic disasters resulting from climate change, the ever faster global warming process, and recently also the SARS-CoV-2 coronavirus pandemic causing the Covid-19 disease, force us to reflect on the scale of imbalance in nature caused by the development of civilization and more and more frequently asked questions: how it is possible to reverse these negative processes, restore balance, reduce environmental pollution, reduce greenhouse gas emissions, develop renewable energy sources, implement the principles of sustainable development based on the concept of sustainable, green circular economy (Annamalah and Paraman, 2021).

Therefore, sustainability in its essence refers to the balance in natural ecosystems. Since man in many aspects disturbs it and side effect of the civilization development is the increase in environmental pollution, climate change, etc., the implementation of the principles of sustainable development into economic processes is an attempt to, at least partially, reverse these negative effects and restore the balance in natural environment. Recently, there are more and more indications that the SARS-CoV-2 (Covid-19) coronavirus pandemic increases pro-ecological social awareness (Dobson, Pimm, Hannah, Kaufman, Ahumada, Ando, Bernstein, Busch, Daszak, Engelmann, Kinnaird, Li, Loch-Temzelides, Lovejoy, Nowak, Roehrdanz, and Vale, 2020).

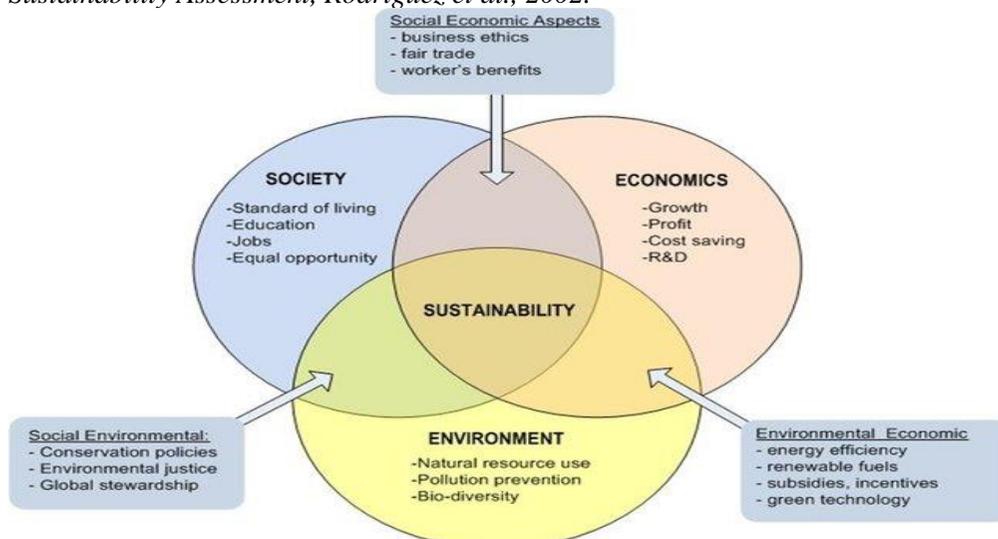
Perhaps, in the coming years, the scale of implementation of the principles of sustainable pro-ecological economic development will increase in accordance with the assumptions of the concept of sustainable, green circular economy, and thus the scope of protection of the natural environment and biodiversity of natural ecosystems will increase (Helm, 2020). If this happens, the development of civilization will be more towards sustainability (Gołębiowska, 2015; Prokopowicz, 2020b). The three interrelated main spheres of sustainability are presented in Figure 5 below.

The issue of implementing the principles of sustainable pro-ecological development is a very important topic for humanity and biodiversity of the planet Earth. Security cannot be taken care of if the most basic needs related to existence are not threaten. In order for the principles of sustainable pro-ecological development to be implemented on a large scale in economic processes, systemic, legal, business changes, etc. are necessary, which are part of pro-ecological reforms implemented in accordance with the concept of sustainable, green circular economy (Jackson, 2009). For this to be possible, the classical economy should transform into a sustainable, green circular economy.

Due to the negative effects of the intensive development of industry, the increase in greenhouse gas emissions and the accelerating process of global warming, humanity should reform the development of its entire civilization in the pro-ecological

direction. The principles of sustainable and environmentally friendly development should be implemented in every field of industrial and human development (Hanna, Xu, and Victor, 2020). Due to the accelerating accelerating process of global warming, there is less and less time to implement these pro-ecological reforms, if the present generations of people do not want to implement the global climate crisis at the end of the 21st century for the next generations.

Figure 5. Interplay of the environmental, economic, and social aspects of sustainable development. Mark Fedkin. Adopted from the University of Michigan Sustainability Assessment, Rodriguez et al., 2002.



Source: Utama I., Utama M. (2019). *The Political Law on Coal Mining in the Fulfilment of People's Welfare in Indonesia*, (in:) "Sriwijaya Law Review", Vol. 3 Issue 1, January 2019, pp. 11-25, (<http://journal.fh.unsri.ac.id/index.php/sriwijayalawreview>; https://www.researchgate.net/publication/330762891_The_Political_Law_on_Coal_Mining_in_the_Fulfilment_of_People%27s_Welfare_in_Indonesia).

Regardless of the current state of economic development in the world, the scale of environmental degradation, the progressing global warming process, increasing diversification of incomes and living standards of citizens, many industries should be reformed and the free development of markets on a national and international scale should be developed (Lenzen, Moran, Kanemoto, Foran, Lobefaro, and Geschke, 2012), and the principles of environmentally sustainable should be implemented development to economic processes. These principles should also be governed by large, supra-national manufacturing, service, financial, etc., corporations, which often have a large impact on globalization processes and the development of individual countries.

Many companies in commercial sectors are not interested in implementing the principles of sustainable development due to the additional costs they would have to

bear. Without state aid, without an appropriate economic policy taking into account the principles of sustainable development, without normative regulations that would force commercial enterprises to implement the principles of sustainable development, the process of developing pro-ecological reforms will be slow, too slow. And yet the process of global warming is progressing faster and faster, humanity has less and less time to introduce the necessary pro-ecological reforms, primarily to reduce greenhouse gas emissions, improve waste segregation and recycling, develop energy based on renewable energy sources, replace plastic with biodegradable materials, develop electromobility, protection of biodiversity (McElwee, Turnout, Chiroleu-Assouline, Clapp, Isenhour, Jackson, Kelemen, Miller, Rusch, Spangenberg, Waldron, Baumgartner, Bleys, Howard, Mungatana, Ngo, Ring, Santos, 2020) of natural natural ecosystems, development of sustainable organic farming, etc., (Khan, Naseem Siddiqui, Khan, Ullah, Wali, Uddin Khan, Ismail, and Ihtisham, 2021).

On the other hand, in recent years there are more and more commercially operating companies and financial institutions (Gołębiowska, 2015; Dmowski and Prokopowicz, 2010) that engage in these pro-ecological activities. Some of these institutions want to improve their image by conducting para-social marketing campaigns and organizing public relations conferences. This can be also a good first step on the path towards disseminating and making the public aware of the highest priority of sustainable and environmentally friendly development in accordance with the principles of a sustainable, green circular economy. On the other hand, during the pro-environmental transformation of the economy, there are also tangible macroeconomic benefits, such as the creation of new jobs in enterprises and companies implementing green investments (Hanna, Xu, and Victor, 2020).

There are many indications that the current SARS-CoV-2 (Covid-19) coronavirus pandemic will increase pro-ecological awareness, contribute to increasing the scale of biodiversity protection and the need to increase the scale of implementation of the principles of sustainable development into economic processes (Gołębiowska, 2015; Golczak, Golinowski, Kamycki, Lewandowski, Pająk, Płaczek, Prokopowicz, and Wesółowski, 2021).

If the climate change issues are properly addressed, the most important threats can be also limited. To name just a few - extreme weather events and disasters occurrence, sea-level rise and coastal degradation can be controlled if the level of greenhouse gases emissions is lowered. As a result, general stability and level of security is provided. Therefore the food and water security is better including proper trans-boundary water management and fair prices and provision of food. This would help to improve livelihood insecurity and avoid the conflicts as well as illegal and uncontrolled migration (Intergovernmental Panel on Climate Change, 2014).

Still Smil argues that: Any meaningful cost-benefit analysis of these (real and perceived) personal gains and burdens inherent in mass consumption is impossible

as the two effects have no common metric. The judgment falls largely into the realm of value. But (as challenging as it may be) appraising the collective gains and losses of global economic growth and mass consumption raises indisputable concerns, above all because of intergenerational obligations arising from the need to maintain a habitable biosphere. Again, techno-optimists are not perturbed and cite the recent dematerialization trend as a key shift promised to make a new world possible (Smil, 2019).

There are ore and more voices agreeing upon the seriousness of the threat, i.e. environmental problems have contributed to numerous collapses of civilizations in the past. Now, for the first time, a global collapse appears likely. Overpopulation, overconsumption by the rich and poor choices of technologies are major drivers; dramatic cultural change provides the main hope of averting calamity (Ehrlich, 2013).

4. The Impact of the SARS-CoV-2 (Covid-19) Coronavirus Pandemic on the Process of Pro-Environmental Transformation of the Economy

Paradoxically, the biggest threats and problems despite of having their destructive side, have also a transformative side. Global problems, especially global crises inspire people to change their thinking in the pro-ecological direction and mobilize communities to pro-ecological actions and reforms aimed at increasing the scale of environmental protection, rehabilitation of the degraded environment of natural ecosystems, etc.

The largest global crises, including pandemic, economic and social crises etc. forced us to reflect on the role and meaning of man in nature. The development of civilization caused an imbalance in natural ecosystems. The number of species of flora and fauna decreases quickly from year to year. The biodiversity of biological ecosystems is diminishing (McElwee, Turnout, Chiroleu-Assouline, Clapp, Isenhour, Jackson, Kelemen, Miller, Rusch, Spangenberg, Waldron, Baumgartner, Bleys, Howard, Mungatana, Ngo, Ring, and Santos, 2020). The adverse effects of climate change in the form of droughts, floods and others appear more and more often (Munroe, Roe, Doswald, Spencer, Möller, Vira, Reid, Kontoleon, Giuliani, Castelli, and Stephens, 2012). In 2019, the greatest number of forest fires occurred. Since the end of the 19th century, the average temperature of the atmosphere at the Earth's surface has been gradually increasing. Environmental pollution is increasing.

Pollution of the environment with plastic has increased particularly rapidly in recent years. Many research results in the field of climatology and ecology confirm the accelerating greenhouse gas emissions in recent years, which causes the accelerating process of global warming. With each successive year there are more and more examples of the growing scale of imbalances in nature caused by the development of human civilization. Therefore, human responsibility for the state of nature on planet Earth is very great. The biodiversity of natural ecosystems was created over millions

of years in nature and now it is most up to humans what will happen to the issue of biodiversity in the future. Therefore, man should take care to maintain the present state of natural biodiversity to the greatest extent and to restore biodiverse ecosystems in industrially degraded places.

In 2020, in connection with the development of the SARS-CoV-2 (Covid-19) coronavirus pandemic, in many parts of the world there was a significant decline in industrial production due to a decline in demand, lockdowns on specific sectors of the economy, periods of home quarantine covering almost the entire society (Hepburn, O'Callaghan, Stern, Stiglitz, and Zenghelis, 2020). Consequently, environmental pollution has decreased and greenhouse gas emissions have decreased in these regions of the world. Perhaps the SARS-CoV-2 coronavirus pandemic will increase the importance and discussion on the protection of natural biodiversity, maintaining balance in nature, nature protection and the need to implement the principles of sustainable development to limit and slow down the processes of adverse climate change (Amran, Periasamy, and Zulkafli, 2014).

In order to slow down the ever faster global warming process, it is necessary to reduce all or most of greenhouse gas emissions in the shortest possible time, reform the energy sector through the development of renewable energy sources and carry out other pro-ecological reforms in order to implement the principles of sustainable pro-ecological development carried out in accordance with the principles of a sustainable, green circular economy (Gołębiowska, 2015; Prokopowicz, 2020b).

In addition, activities in the field of nature protection, protection of natural biological ecosystems, protection of earth's biodiversity and its preservation for future generations should also be intensified. Therefore, the current global socio-economic crisis caused by the development of the SARS-CoV-2 (Covid-19) coronavirus pandemic should significantly change the pro-ecological awareness of people and the need to implement sustainable development in economic processes and everyday functioning of people (Jänicke, 2011). In connection with the above, perhaps the global policy of sustainable development will be strengthened.

Epidemics like this remind people of how small they are in the face of the forces and laws of nature. Perhaps the SARS-CoV-2 coronavirus pandemic will also force humans to reflect on this issue. Currently, in connection with the development of the SARS-CoV-2 coronavirus pandemic, there has been a significant decline in industrial production in many parts of the world due to a decline in demand and home quarantine (Gołębiowska, 2015; Golczak, Golinowski, Kamycki, Lewandowski, Pająk, Płaczek, Prokopowicz, and Wesołowski, 2021).

Consequently, environmental pollution has decreased and greenhouse gas emissions have decreased in these regions of the world. Perhaps the Coronavirus pandemic will increase the importance and discussion on the protection of natural biodiversity, maintaining balance in nature, nature protection and the need to implement the

principles of sustainable development to limit and slow down the processes of adverse climate change.

The global socio-economic crisis caused by the development of the SARS-CoV-2 (Covid-19) coronavirus pandemic, which occurred in 2020, should significantly change the pro-ecological awareness of people and the need to implement sustainable development in economic processes and everyday functioning of people. Much scientific data from climatologists' research indicates that the process of global warming has entered a strong upward trend and perhaps humanity has little influence on changing the pace of continuing this process.

However, regardless of this, we should do everything we can to implement the principles of sustainable pro-ecological economic development, including the necessary pro-ecological reforms, primarily in the energy sector by developing renewable energy sources, electromobility, developing ecological agriculture (Khan, Naseem Siddiqui, Khan, Ullah, Wali, Uddin Khan, Ismail, and Ihtisham, 2021), improving waste segregation techniques, recycling, etc. economic development carried out in accordance with the principles of a sustainable, green circular economy, financed by green finance (Bouma, Jeucken, and Klinkers, 2017), etc., is a new idea, the importance of which should grow in the future and be the main idea of the development of civilization in the 21st century (Barbier, 2009).

With the respect to the above, perhaps the global policy of sustainable development will be strengthened. Epidemics like this remind people of how small they are in the face of the forces and laws of nature. Perhaps the SARS-CoV-2 (Covid-19) coronavirus pandemic will also force people to reflect on this issue. One of the effects of a pandemic is that man remembers that he is only one of the millions of different life forms that have existed for millions of years on planet Earth in a balance of many species of life, including flora, fauna, fungi and microorganisms with natural ecosystems evolving over millions of years.

Perhaps people in the coming years will apply the principles of sustainable, pro-ecological development to a greater extent. Perhaps we do not know this yet. Everything will be clarified in the future. Currently, with the spread of the SARS-CoV-2 (Covid-19) coronavirus pandemic, there has been a significant decline in industrial production in many parts of the world due to falling demand and home quarantine. Consequently, environmental pollution has decreased and greenhouse gas emissions have decreased in these regions of the world. Perhaps the SARS-CoV-2 coronavirus epidemic will increase the importance and discussion on the protection of natural biodiversity, maintaining balance in nature (Newbold, Hudson, Hill, Contu, Lysenko, Senior, Börger, Bennett, Choimes, Collen, Day, De Palma, Díaz, Echeverria-Londoño, Edgar, Feldman, Garon, Harrison, Alhousseini, and Purvis, 2015), nature protection and the need to implement the principles of sustainable development to limit and slow down the processes of adverse climate change (Gołębiowska, 2015; Prokopowicz, 2020a).

Bearing the aforementioned in mind, Authors are of opinion, that the processes of implementing the principles of sustainable pro-ecological development should be developed according to the concept of a sustainable, green circular economy. By increasing the scope of implementation of the principles of sustainable pro-ecological development, carried out in accordance with the concept of sustainable, green circular economy (Chapple, 2008), activities related to nature protection, protection of natural biological ecosystems, protection of earth's biodiversity and its preservation for future generations can also be improved.

Due to the increasingly frequent weather anomalies, the progressing global warming process, the adverse effects of climate change (droughts, floods) and crises caused by natural factors (epidemics), the growing environmental pollution, the need and necessity to implement the principles of sustainable, pro-ecological development into economic processes is growing in line with the principles of a sustainable, green circular economy. Perhaps the development of the SARS-CoV-2 pandemic causing the Covid-19 disease will change human thinking about the importance of ecology, sustainable development of civilization, including the need to develop civilization in accordance with the principles of sustainable, green circular economy (Gołębiowska, 2015; Prokopowicz, 2020b).

Therefore, after the era of the SARS-CoV-2 coronavirus pandemic, there may be an increase in the scale of implementation of the principles of sustainable, pro-ecological development conducted according to the principles of a sustainable, green circular economy. If this happened, the adverse side effects of the development of civilization to date, such as the increasing pollution of the natural environment in recent years, an increase in greenhouse gas emissions, accelerating the process of global warming, more and more frequent weather anomalies (droughts, floods) and their adverse effects (droughts, fires) perhaps they will decrease, negative processes and effects will be limited.

The aforementioned pro-ecological reforms implemented in accordance with the concept of green economy are necessary to at least partially slow down the process of global warming (Gołębiowska, 2015; Czaja, Becla, Włodarczyk, and Poskrobko, 2012). We owe it to future generations, we owe it to our children and grandchildren. One of the key elements and principles of a sustainable, green circular economy, i.e., primarily the implementation of pro-ecological reforms consisting in the implementation of the principles of sustainable pro-ecological economic development (Geels, 2011), is nature protection, protection of natural biological ecosystems, protection of earth's biodiversity (Gołębiowska, 2015; Blicharska, Smithers, Mikusiński, Rönnbäck, Harrison, Nilsson, and Sutherland, 2019) and its preservation for future generations. If the SARS-CoV-2 coronavirus pandemic causes a change in people's thinking consisting in appreciating the high level of importance of sustainable development, pro-ecological reforms and returning to a balance in nature, perhaps also national environmental policies and the World Sustainable Development Policy may increase their importance and scale of

development in the future. On the other hand, the applied anti-crisis public aid programs offered to economic entities significantly limited the scale of the economic downturn and recession in 2020. In addition, during the economic crisis caused by the pandemic, large infrastructural investment projects financed from the public finance system of the state were continued and developed, which also acted as anti-crisis economic undertakings that fit into the concepts of Keynesian, systemic anti-crisis measures (Gołębiowska, 2015; Gwoździewicz and Prokopowicz, 2015). The main purpose of the so-called anti-crisis shields was to limit the scale of the increase in unemployment (Gołębiowska, 2015; Domańska-Szaruga and Prokopowicz, 2015). Consequently, the decline in economic activity and consumption during the first wave of the pandemic was relatively short-lived.

5. Conclusions

The current global socio-economic crisis caused by the development of the SARS-CoV-2 (Covid-19) coronavirus pandemic should significantly change the pro-ecological awareness of people and the need to implement sustainable development in economic processes and everyday functioning of people. Much scientific data from climatologists' research indicates that the process of global warming has entered a strong upward trend and perhaps humanity has little influence on changing the pace of continuing this process.

However, regardless of this, we should do everything we can to implement the principles of sustainable pro-ecological economic development, including the necessary pro-ecological reforms, primarily in the energy sector by developing renewable energy sources, electromobility, developing organic farming, improving waste segregation techniques, recycling, etc. In my opinion sustainable pro-ecological economic development conducted in accordance with the philosophy of green economy, financed with green finance (Fullwiler, 2015), etc. is a new idea, the importance of which should grow in the future and be the main idea of the development of civilization in the 21st century (Gołębiowska, 2015; Prokopowicz, 2020b).

In connection with the above, perhaps the global policy of sustainable development will be strengthened. Epidemics like this remind people of how small they are in the face of the forces and laws of nature. Perhaps the SARS-CoV-2 coronavirus pandemic causing the Covid-19 disease will also force people to reflect on this issue. One of the effects of a pandemic is that man remembers that he is only one of the millions of different life forms that have existed for millions of years on planet Earth in a balance of many species of life, including flora, fauna, fungi and microorganisms with natural ecosystems evolving over millions of years (Janishevski, Santamaria, Gidda, Cooper, and Brancalion, 2015). Perhaps in the coming years, people will apply the principles of sustainable, pro-ecological development to a greater extent.

In view of the above, in my opinion, the processes of implementing the principles of sustainable pro-ecological development should be developed according to the principles of a sustainable, green circular economy (Reichel, De Schoenmakere, Gillabel, Martin, and Hoogeveen, 2016). By increasing the scope of implementation of the principles of sustainable pro-ecological development carried out in accordance with the principles of sustainable, green circular economy, the activities related to nature protection, protection of natural biological ecosystems, protection of terrestrial biodiversity and its preservation for future generations can also be improved.

Due to the increasingly frequent weather anomalies, the progressing global warming process, the adverse effects of climate change (droughts, floods) (Chong, 2014) and crises caused by natural factors (epidemics), the growing environmental pollution, the need and necessity to implement the principles of sustainable, pro-ecological development into economic processes is growing in line with the principles of a sustainable, green circular economy. Perhaps the development of the SARS-CoV-2 (Covid-19) coronavirus pandemic will change human thinking about the importance of ecology, sustainable development of civilization, including the need to develop civilization in accordance with the principles of a sustainable, green circular economy (Gołębiowska, 2015; Prokopowicz, 2020a).

Therefore, after the era of the SARS-CoV-2 coronavirus pandemic, there may be an increase in the scale of implementation of the principles of sustainable, pro-ecological development conducted according to the principles of a sustainable, green circular economy. If this happened, the adverse side effects of the development of civilization to date, such as the increasing pollution of the natural environment in recent years, an increase in greenhouse gas emissions, accelerating the process of global warming, more and more frequent weather anomalies (droughts, floods) and their adverse effects (droughts, fires) perhaps they will decrease, negative processes and effects will be limited. The above-mentioned pro-ecological reforms implemented in accordance with the concept of green economy are necessary to at least partially slow down the process of global warming. We owe it to future generations, we owe it to our children and grandchildren.

One of the key elements and principles of a sustainable, green circular economy (Gołębiowska, 2015; Ryszewska, 2016), i.e., primarily the implementation of pro-ecological reforms consisting in the implementation of the principles of sustainable pro-ecological economic development, is nature protection, protection of natural biological ecosystems, protection of earth's biodiversity and its preservation for future generations. If the SARS-CoV-2 pandemic causing the Covid-19 disease causes a change in people's thinking by appreciating the high level of importance of sustainable development, pro-ecological reforms and a return to balance in nature, perhaps that also national environmental policies and the World Sustainable Development Policy can increase its importance and scale of development in the future.

In addition, many of the issues and determinants of the implementation of the goals of sustainable development and pro-environmental transformation of the economy discussed in this article require normative clarification and amendment of legal regulations.

Summing up, in connection with the progressing global warming process, the importance of urgently carrying out the pro-environmental transformation of the classic growth, brown, linear surplus economy to a sustainable, green, zero-emission economy of zero growth and a closed loop is growing. As part of this transformation, it is necessary to increase the scale of achieving the goals of sustainable development, development of renewable energy sources, ecological farming, electromobility, stop the deforestation process and develop afforestation programs, implementation of ecological technologies and ecological innovations, etc., and other goals for the development of green economy.

These issues were discussed in early November 2021 at the UN COP26 Climate Conference in Glasgow, Scotland. However, according to the vast majority of international security and climate change experts' opinions the decisions and declarations made by the states during "just another COP - a great arena for high level opinion exchange" but backed by not efficient decision implementation. If that is the case, we might be left without specific and binding provisions and a significant acceleration of the process of bringing the economy to zero emissions. Bearing that in mind, the security situation will deteriorate and all the worst case scenarios might come truth. As mentioned before the time is high and in case the threats are not addressed, we might repeat the fate of numerous civilisations that collapsed in the past because of environmental problems. Now, for the first time, a global collapse appears likely (Ehrlich, 2013).

References:

- Adapting to Climate Change: How Ready is Your Country? 2020. Knoema.com website, Data Driven, January 15. <https://knoema.com/infographics/wemjthe/adapting-to-climate-change-how-ready-is-your-country>), for: Notre Dame Global Adaptation Initiative.
- Amran, A., Periasamy, V., Zulkafli, A.H. 2014. Determinants of climate change disclosure by developed and emerging countries in Asia Pacific. *Sustainable Development*, 22, 3, 188-204.
- Annamalah, S., Paraman, P. 2021. The Malaysian Dilemma: Constructing a Sustainable Economy in the PostCOVID-19 Era. *International Journal of Advance Research and Innovation*, 9(1), 1-3. SEGi University College, Kuala Lumpur, Malaysia, 1-3.
- AR6 Climate Change 2021: The Physical Science Basis. 2021. IPCC Sixth Assessment Report, Intergovernmental Panel on Climate Change (IPCC). August 9, 2021 <https://www.ipcc.ch/report/ar6/wg1>.
- Barbier, E.B. 2009. Rethinking the Economic Recovery: A Global Green New Deal. UNEP.
- Blicharska, M., Smithers, R.J., Mikusiński, G., Rönnbäck, P., Harrison, P.A., Nilsson, M., Sutherland, W.J. 2019. Biodiversity's contributions to sustainable development.

- Nature Sustainability, November.
<https://www.researchgate.net/publication/337522739>; <https://rdcu.be/bXARU>. DOI: 10.1038/s41893-019-0417-9.
- Bouma, J.J., Jeucken, M., Klinkers, L. 2017. *Sustainable Banking: The Greening of Finance*. Routledge. 480 p.
- Chapple, K. 2008. *Defining the Green Economy: A Primer on Green Economic Development*. University of California, Berkeley.
- Chong, J. 2014. Ecosystem-based approaches to climate change adaptation: progress and challenges. *International Environmental Agreements: Politics, Law and Economics*, 14(4), 391-405. <https://doi.org/10.1007/s10784-014-9242-9>.
- Climate change widespread, rapid, and intensifying – IPCC. 2021. IPCC Sixth Assessment Report, Intergovernmental Panel on Climate Change (IPCC), August 9, 2021. <https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr>.
- COP26: Global Innovation Hub Launched for Transformative Climate Solutions, Website: United Nations Climate Change, 31 Oct-12 Nov 2021. <https://unfccc.int/news/cop26-global-innovation-hub-launched-for-transformative-climate-solutions>.
- Czaja, S., Becla, A., Włodarczyk, J., Poskrobko, T. 2012. *Wyzwania współczesnej ekonomii. Wybrane problemy*. Warszawa, Difin.
- Dmowski, A., Prokopowicz, D. 2010. *Rynki finansowe*. Warsaw, Wydawnictwo Centrum Doradztwa i Informacji Difin sp. z o.o., 304-320.
- Dobson, A.P., Pimm, S.L., Hannah, L., Kaufman, L., Ahumada, J.A., Ando, A.W., Bernstein, A., Busch, J., Daszak, P., Engelmann, J., Kinnaird, M.F., Li, B.V., Loch-Temzelides, T., Lovejoy, T., Nowak, K., Roehrdanz, P.R., Vale, M.M. 2020. Ecology and economics for pandemic prevention. *Science*, 369(6502), 379-381. <https://doi.org/10.1126/science.abc3189>.
- Domańska-Szaruga, B., Prokopowicz, D. 2015. Makroekonomiczne zarządzanie anty kryzysowe. 34 Zeszyty Naukowe Uniwersytetu Przyrodniczo – Humanistycznego w Siedlcach, nr 107, Seria: Administracja i Zarządzanie (34) 2015, UPH Wydział Nauk Ekonomicznych i Prawnych, Siedlce 2015, 37-48.
- Ehrlich, P.R., Ehrlich, A.H. 2013. Can a collapse of global civilization be avoided? *Proceedings of the Royal Society B* 280:20122845. <http://dx.doi.org/10.1098/rspb.2012.2845>.
- Everard, M., Johnston, P., Santillo, D., Staddon, C. 2020. The role of ecosystems in mitigation and management of Covid-19 and other zoonoses. *Environmental Science and Policy*, 111, 7-17. <https://doi.org/10.1016/j.envsci.2020.05.017>.
- Fullwiler, S.T. 2015. *Sustainable Finance: Building a More General Theory of Finance*. Binzagr Institute for Sustainable Prosperity, Working Paper, No. 106.
- Geels, F.W. 2011. The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1, 24.
- Glasgow Climate Change Conference – October-November 2021. Website: United Nations Climate Change, 31 Oct - 12 Nov 2021. <https://unfccc.int/conference/glasgow-climate-change-conference-october-november-2021>.
- Global Greenhouse Gas Emissions from Livestock. Knoema.com. website, Data Driven, August 1, 2016. <https://knoema.com/infographics/maodxhb/global-greenhouse-gas-emissions-from-livestock>, for: Report by the Food and Agriculture Organization, EDGAR, World Resources Institute.

- Greater Ambition Now Critical as UN Climate Change Conference Opens. Website: United Nations Climate Change, 31 Oct - 12 Nov 2021. <https://unfccc.int/news/greater-ambition-now-critical-as-un-climate-change-conference-opens>.
- Golczak, K., Golinowski, K., Kamycki, J., Lewandowski, K.J., Pająk, K., Płaczek, J., Prokopowicz, D., Wesołowski, Z. 2021. Prognoza globalnego kryzysu finansowo-gospodarczego zdeterminowanego przez pandemię koronawirusa w obszarze gospodarczym, społecznym, politycznym i geopolitycznym. Prognoza kryzysu w obszarze gospodarczym. In: P. Soroka, A. Skrabacz, P. Wilczyński, K. Golczak, R. Kołodziejczyk, K. Pająk, A. Mitręga (red.) Raport zawierający diagnozę i prognozę globalnego kryzysu finansowo-gospodarczego zdeterminowanego przez pandemię koronawirusa w obszarze gospodarczym, społecznym, politycznym i geopolitycznym. Dom Wydawniczy Elipsa, Warszawa, 87-120.
- Gołębiowska, A. 2015. Zasada zrównoważonego rozwoju w prawie międzynarodowym. Zarządzanie zrównoważonym rozwojem jednostek samorządu terytorialnego, E. Sobczak, (ed.), Warsaw, 7-23.
- Goodland, R. 1995. The concept of environmental sustainability. *Annual Review of Ecology and Systematics*, 26(1), 1-24.
- Gwoździwicz, S., Prokopowicz, D. 2015. The role and application of Keynesian macroeconomic anti-crisis theories in the context of development of the financial system in Poland. *Globalization, the State and the Individual. International Scientific Journal, Free University of Varna "Chernorizets Hrabar", Chayka, Varna, Bułgaria 9007, 3(7), 47-58.*
- Hanna, R., Xu, Y., Victor, D.G. 2020. After COVID-19, green investment must deliver jobs to get political traction. *Nature*, 582(7811), 178-180. <https://doi.org/10.1038/d41586-020-01682-1>.
- Helm, D. 2020. The Environmental Impacts of the Coronavirus. *Environmental and Resource Economic*, 76(1), 21-38. <https://doi.org/10.1007/s10640-020-00426-z>.
- Hepburn, C., O'Callaghan, B., Stern, N., Stiglitz, J., Zenghelis, D. 2020. Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change? *Oxford Review of Economic Policy*, 36(20), 1-48. <https://doi.org/10.1093/oxrep/gra015>.
- Intergovernmental Panel on Climate Change (IPCC), Climate Change. 2014. *Impacts, Adaptation, and Vulnerability*. IPCC Cambridge University Press: Cambridge.
- Jackson, T. 2009. *Prosperity without Growth. Economics for Finite Planet*. Earthscan, London, p. 288.
- Janishevski, L., Santamaria, C., Gidda, S.B., Cooper, H.D., Brancalion, P.H.S. 2015. Ecosystem restoration, protected areas and biodiversity conservation. *Unasylva*, 245, Vol. 66, 2015/3, 19-27. <https://www.researchgate.net/publication/292643157>.
- Jänicke, M. 2011. *Green Growth: From a Growing Eco-industry to a Sustainable Economy*. Freie Universität Berlin, Berlin.
- Joest, A. 2020. Bamboo, the super plant for community empowerment, to combat the effects of climate change and greener production chains. *AnnJoest.com website, System Innovation for Sustainable Development*. <https://annjoest.com/bamboo-the-super-plant-for-community-empowerment-to-combat-the-effects-of-climate-change-and-greener-production-chains>.
- Kehoe, L., Romero-Muñoz, A., Polaina, E., Estes, L., Kreft, H., Kuemmerle, T. 2017. Biodiversity at risk under future cropland expansion and intensification. *Nature Ecology & Evolution*, 1(8), 1129-1135. <https://doi.org/10.1038/s41559-017-0234-3>.
- Khan, N., Naseem Siddiqui, B., Khan, N., Ullah, N., Wali, A., Uddin Khan, I., Ismail, S., Ihtisham, M. 2021. Drastic impacts of COVID-19 on food, agriculture and

- economy. *Pure and Applied Biolog*, 10(1), 62-68.
<http://dx.doi.org/10.19045/bspab.2021.100008>.
- Le Saout, S., Hoffmann, M., Shi, Y., Hughes, A., Bernard, C., Brooks, T.M., Bertzky, B., Butchart, S.H.M., Stuart, S.N., Badman, T., Rodrigues, A.S.L. 2013. Protected Areas and Effective Biodiversity Conservation. *Science*, 342(6160), 803-805.
<https://doi.org/10.1126/science.1239268>.
- Lenzen, M., Moran, D., Kanemoto, K., Foran, B., Lobefaro, L., Geschke, A. 2012. International trade drives biodiversity threats in developing nations. *Nature*, 486(7401), 109-112. <https://doi.org/10.1038/nature11145>.
- McElwee, P., Turnout, E., Chiroleu-Assouline, M., Clapp, J., Isenhour, C., Jackson, T., Kelemen, E., Miller, D.C., Rusch, G., Spangenberg, J.H., Waldron, A., Baumgartner, R.J., Bleys, B., Howard, M.W., Mungatana, E., Ngo, H., Ring, I., Santos, R. 2020. Ensuring a Post-COVID Economic Agenda Tackles Global Biodiversity Loss. *One Earth*, 3(4), 448-461.
<https://doi.org/10.1016/j.oneear.2020.09.011>.
- Munroe, R., Roe, D., Doswald, N., Spencer, T., Möllet, I., Vira, B., Reid, H., Kontoleon, A., Giuliani, A., Castelli, I., Stephens, J. 2012. Review of the evidence base for ecosystem-based approaches for adaptation to climate change. *Environmental Evidence*, 1(1), 1-11. <https://doi.org/10.1186/2047-2382-1-13>.
- Newbold, T., Hudson, L.N., Hill, S.L.L., Contu, S., Lysenko, I., Senior, R.A., Börger, L., Bennett, D.J., Choimes, A., Collen, B., Day, J., De Palma, A., Díaz, S., Echeverria-Londoño, S., Edgar, M.J., Feldman, A., Garon, M., Harrison, M.L.K.K., Alhusseini, T., Purvis, A. 2015. Global effects of land use on local terrestrial biodiversity. *Nature*, 520(7545), 45-50. <https://doi.org/10.1038/nature14324>.
- Prokopowicz, D. 2020a. Implementacja zasad zrównoważonego rozwoju gospodarczego jako kluczowy element proekologicznej transformacji gospodarki w kierunku green economy i circular economy, Referat wygłoszony podczas XXIV Konferencji Naukowej pt. "Filozofia zrównoważonego rozwoju", 19.11.2020 – 20.11.2020, Instytut Ekonomii i Finansów, Wydział Społeczno-Ekonomiczny, Uniwersytet Kardynała Stefana Wyszyńskiego w Warszawie, Konferencja on-line za pośrednictwem Cisco Webex Events.
- Prokopowicz, D. 2020b. Implementation of The Principles of Sustainable Economy development as a key element of Pro-ecological transformation of The Economy towards Green Economy and Circular Economy. *International Journal of New Economics and Social Sciences*, Międzynarodowy Instytut Innowacji Nauka - Edukacja - Rozwój w Warszawie, 11(1), 417-480. ISSN 2450-2146. DOI: 10.5604/01.3001.0014.3558, GICID: 01.3001.0014.3558.
<https://ijoness.com/resources/html/article/details?id=207132>.
- Reichel, A., De Schoenmakere, M., Gillabel, J., Martin, J., Hoogeveen, Y. 2016. Circular economy in Europe: Developing the knowledge base. *European Environment Agency Report*, 2.
- Ritchie, H., Roser, M. 2020. CO2 and other Greenhouse Gas Emissions. Internet portal Our World in Data. <https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions>, after: Hadley Center (HadCRUT4).
- Ryszawska, B. 2016. Zielona transformacja gospodarki jako droga do gospodarki umiaru, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu. Wrocław.
<https://www.researchgate.net/publication/323187501>.
- Smil, V., Smil, V. 2019. *Growth: From Microorganisms to Megacities*. Cambridge, MA: MIT Press.

- Utama, I., Utama, M. 2019. The Political Law on Coal Mining in the Fulfilment of People's Welfare in Indonesia. *Sriwijaya Law Review*, 3(1), 11-25.
<http://journal.fh.unsri.ac.id/index.php/sriwijayalawreview>;
https://www.researchgate.net/publication/330762891_The_Political_Law_on_Coal_Mining_in_the_Fulfilment_of_People%27s_Welfare_in_Indonesia.
- UN Secretary-General: COP26 Must Keep 1.5 Degrees Celsius Goal Alive, Website: United Nations Climate Change, 31 Oct - 12 Nov 2021. <https://unfccc.int/news/un-secretary-general-cop26-must-keep-15-degrees-celsius-goal-alive>.
- Vivekananda, J., Rüttinger, L. 2016. Understanding the compound risks of climate change and fragility. *SIPRI Yearbook*.