

## The Adverse Effects of Climate Change on Sustainable Development in the Context of Legal Framework(\*)

Dr. Nurullah GÖRGEN(\*\*)

### Abstract

Paragraph 14 of the 2015-2030 Agenda for Sustainable Development states that 'Climate change is one of the greatest challenges of our time and its adverse impacts undermine the ability of all countries to achieve sustainable development'. The aim of this article is to critically evaluate this statement with reference to the existing relevant legal framework, including its fitness for purpose. The article will address the necessary definitions of climate change, sustainable development, relationship between them under legal framework and how the adverse impacts of climate change negatively affect sustainable development. For this, the most prominent examples of the Adverse Effects of Climate Change on Sustainable Development will be demonstrated by explaining how its adverse impacts weaken the capacity of states to succeed sustainable development. In order to overcome the adverse impacts of climate change, existing fundamental challenges will be addressed in the context of sustainable development and will be shown how to address contemporary challenges. Finally, this article will demonstrate if states and individuals do not take necessary precautions and develop new policy to prevent the adverse effect of climate change in the national and international levels, countries could not achieve sustainable development goals.

### Keywords

Climate Change, Sustainable Development, Environmental Law, The Adverse Effects of Climate.

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(\*\*) Durham Üniversitesi, Hukuk Fakültesi, Kamu Hukuku, Durham, İngiltere.

E-posta: nurullah.gorgen@durham.ac.uk.

Orcid: <http://orcid.org/0000-0002-7713-8273>.



## Yasal Çerçeve de İklim Değişikliğinin Olumsuz Etkilerinin Sürdürülebilir Kalkınma Üzerindeki Etkisi

### Öz

2015-2030 Sürdürülebilir Kalkınma ajandasının 14. Paragrafında belirttiği üzere 'iklim değişikliği zamanımızın en büyük zorluklarından biridir; ve onun olumsuz etkileri tüm ülkelerin sürdürülebilir kalkınma hedeflerini tutturma kabiliyetini zayıflatır.' Bu makalenin amacı; bu ifadeyi, amaca uygunluk da dahil olmak üzere, güncel hukuka referansla eleştirel olarak değerlendirmektir. Bu makale iklim değişikliğinin, sürdürülebilir kalkınmanın tanımlarını ve birbirleriyle ilişkilerini hukuki çerçevede ele alacaktır ve iklim değişikliğinin olumsuz etkilerinin sürdürülebilir kalkınmayı nasıl kötü bir şekilde etkilediği gösterilecektir. Bunun için, iklim değişikliğinin olumsuz etkilerinin sürdürülebilir kalkınma üzerinde etkisini en öne çıkan örneklerle ifade edilecektir ve bu olumsuz etkilerin devletlerin sürdürülebilir kalkınma kapasitelerini nasıl zayıflattığı açıklanacaktır. İklim değişikliğinin olumsuz etkilerini üstesinden gelmek için, sürdürülebilir kalkınma bağlamında var olan temel zorluklar ifade edilecek ve bu güncel zorlukların çözümleri ele alınacaktır. Son olarak, makale eğer devletlerin ve bireyler iklim değişikliğini olumsuz etkileri için ulusal ve uluslararası gerekli önlemleri almaz ve yeni bir politika geliştirmezlerse, ülkelerin sürdürülebilir kalkınma amaçlarına ulaşamayacaklarını ifade edecektir.

### Anahtar Kelimeler

İklim Değişikliği, Sürdürülebilir Kalkınma, Çevre Hukuku, İklim Değişikliğini Olumsuz Etkileri.

## I. INTRODUCTION

In the 21st Century, climate change is one of the greatest threats that affect all humanity. The Intergovernmental Panel on Climate Change (IPCC) says undoubtedly there has been an unprecedented warming in the global climate system since 1950's and climate change impacts widely human and natural systems<sup>1</sup>. Nevertheless, one of the biggest obstacles of sustainable development is climate change, as the adverse effects of climate change cause difficulties for countries to achieve sustainable development goals<sup>2</sup>. The concepts of climate change and sustainable development undeniably relate and influence each other in various aspects.

In this paper, climate change, sustainable development, relationship between them and how the adverse impacts of climate change negatively affect sustainable development will be addressed. While doing this, the paper will consist of three parts. In the first chapter, the definition of climate change and sustainable development in the literature will be given and will be handled in legal framework. In the second part, the negative impacts of climate change will be addressed and how they negatively affect the ability of countries to achieve sustainable development. In the third part, contemporary challenges, which preventing to address the climate change problem, will be examined. In doing so, the article will critically evaluate the existing relevant legal framework including its fitness for purpose.

## II. FUNDAMENTAL CONCEPTS AND LEGAL FRAMEWORK

### A. Sustainable Development

The most common definition for sustainable development is articulated in the World Commission on Environment and Development (WCED), known as Our Common Future (Brundtland Report) 1987, 'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'<sup>3</sup>.

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<sup>1</sup> RK Pachauri, Leo Mayer and Intergovernmental Panel on Climate Change (eds), *Climate Change 2014: Synthesis Report* (Intergovernmental Panel on Climate Change 2015).

<sup>2</sup> 'Transforming Our World: The 2030 Agenda for Sustainable Development' <[https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A\\_RES\\_70\\_1\\_E.pdf](https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf)> accessed 21 December 2017.

<sup>3</sup> 'Our Common Future, Chapter 2: Towards Sustainable Development - A/42/427 Annex, Chapter 2 - UN Documents: Gathering a Body of Global Agreements' <<http://www.un-documents.net/ocf-02.htm>> accessed 8 September 2023.

The concept of sustainable development has long been known; however, it officially started to be addressed at international level in Stockholm Conference on the Human Environment in 1972<sup>4</sup>. Protecting environment and human-induced environmental problems were addressed for the first time from various angles. Although the conference produced two important documents (Stockholm Declaration and an Action Plan), they are not legally binding. In 1992, 176 countries and thousands of non-governmental organizations (NGO's) came together in Rio de Janeiro, Brazil for the UN Conference on Environment and Development (UNCED or Rio Conference)<sup>5</sup>. Five legal documents were contracted at the conference: the UN Framework Convention on Climate Change (UNFCCC), the Convention on Biodiversity, the Rio Declaration on Environment and Development, Agenda 21, and the Non-Legally Binding Principles on Forests. Although the decisions taken at the conference are not legally binding, twenty-seven principles have helped to establish a framework to achieve sustainable development and an agreement between developed and developing states. In addition, with the establishment of UNFCCC, the importance of climate change has been addressed for the first time for sustainable development. Agenda 21 is a comprehensive but non-binding program addressing the relationship between economy and environment for states, UN organisations, and agencies<sup>6</sup>. In 2000, United Nations Millennium Declaration was accepted by 192 states in New York. The goal of the declaration deals with issues such as security, destruction of poverty, and protection of the environment in the 21th century<sup>7</sup>. In 2002, the countries came together for the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa<sup>8</sup>. In the Johannesburg Declaration, it was emphasized that Sustainable Development consists of three basic parts, economic development, social development, and environmental protection. In 2012, international community

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<sup>4</sup> 'Stockholm Declaration on the Human Environment' (5 June 2018) <<https://wedocs.unep.org/bitstream/handle/20.500.11822/29567/ELGP1StockD.pdf>>. See particularly principles 4, 13, 15-20.

<sup>5</sup> 'The Rio Declaration on Environment and Development (1992)' (6 August 2017) <[https://www.iau-hesd.net/sites/default/files/documents/rio\\_e.pdf](https://www.iau-hesd.net/sites/default/files/documents/rio_e.pdf)>

<sup>6</sup> *ibid.* Annex 2

<sup>7</sup> 'United Nations Millennium Declaration' <[https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A\\_RES\\_55\\_2.pdf](https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_55_2.pdf)> accessed 5 July 2021.

<sup>8</sup> 'World Summit on Sustainable Development: Resolution / Adopted by the General Assembly' <<https://digitallibrary.un.org/record/482206?ln=en>> accessed 8 August 2023.

gathered for the United Nations Conference on Sustainable Development (UNSCD, or Rio+20) in Rio de Janeiro, Brazil. The aim of Rio+20 is the economic development, eliminating poverty and determining the legal framework in the context of Sustainable Development. In 2015, UN General Assembly adopted Transforming Our World: The 2030 Agenda for Sustainable Development (2015)<sup>9</sup>. The agenda consists of the 17 Sustainable Development Goals and 169 targets that aim seeking solutions to problems that prevent sustainable development such as climate change and eradicating poverty. These goals are quite comprehensive and address three scopes of sustainable development: the economic, social and environmental dimensions. The agenda foresees to achieve the aim of sustainable development by fulfilling the goals and targets within 15 years. In particular, the 13th goal states that climate change and its adverse effects urgently need to be tackled. This goal in conjunction with other goals will be discussed below.

## B. Climate Change

According to IPCC, climate change refers 'to any change in climate over time, whether due to natural variability or as a result of human activity'<sup>10</sup>. The definition of UNFCCC is more comprehensive: 'a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.'<sup>11</sup>. It is now well understood that the climate change is a great threat to mankind and the world. The biggest cause for this threat is human-induced climate change because people cause greenhouse gases (GHGs) such as carbon dioxide and methane due to fossil fuels, agricultural and other industrial activities<sup>12</sup>.

The UNFCCC was adopted in Rio Conference in 1992. It is one of the most important documents to be accepted by all world leaders and universal

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<sup>9</sup> 'Transforming Our World: The 2030 Agenda for Sustainable Development' (n 2).

<sup>10</sup> ML Parry and Intergovernmental Panel on Climate Change (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press 2007).

<sup>11</sup> 'United Nations Framework Convention on Climate Change: Resolution / Adopted by the General Assembly' (1994) <<https://digitallibrary.un.org/record/180257?ln=en>> accessed 6 May 2022.

<sup>12</sup> Jeffrey Sachs, *The Age of Sustainable Development* (Columbia University Press 2015) 332.

decisions taken for climate change<sup>13</sup>. The aim of UNFCCC is to establish international system to 'stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-caused) interference with the climate system.'<sup>14</sup> It is emphasized that the biggest cause of the problematic greenhouse gases is the developed states, while the proportion of developing countries is currently low; however, it will increase in time due to social and development needs<sup>15</sup>. Therefore, all countries must fulfil their responsibilities, but developed countries should make more efforts to deal with climate change. States parties have agreed to limit national GHGs emissions produced by human societies, adopted national policies to mitigate climate change, and adopted all measures related to climate change.

In 1997 in Kyoto Japan, Kyoto Protocol was adopted by almost all industrialized countries with the noteworthy exception of the United States of America<sup>16</sup>. The most important feature of the contract is that concrete and binding targets were set to combat climate change. According to protocol, binding targets and timetables have been identified for high-income countries to reduce their emissions. Developing countries, including China, which is developing very fast, currently do not have to comply with such obligations<sup>17</sup>. It can be said that the responsibility of developed countries is higher compared to those of developing countries. One of the targets of the protocol - for between 2008 and 2012 - was decreasing emissions of greenhouse gases by the parties by at least 5% below 1990 levels. For this, control and emission reduction targets have been identified between Annex I Parties with the differentiation of responsibilities and these targets are listed in Annex B of the Kyoto Protocol<sup>18</sup>.

In 2015, Paris Agreement was accepted with the participation of 195 countries under UNFCCC<sup>19</sup>. The contract has great importance as it showed

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<sup>13</sup> Joseph Romm, *Climate Change What Everyone Needs to Know* (Oxford University Press 2016) 149.

<sup>14</sup> 'United Nations Framework Convention on Climate Change: Resolution / Adopted by the General Assembly' (n 11).

<sup>15</sup> Ibid.

<sup>16</sup> 'Kyoto Protocol to the United Nations Framework Convention on Climate Change' (1998) <<https://unfccc.int/resource/docs/convkp/kpeng.pdf>> accessed 20 November 2021.

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.

<sup>19</sup> 'Adoption of the Paris Agreement' (2015) <<https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>> accessed 8 April 2018.

countries understand that they must fight climate change for sustainable development and work for a zero-carbon, resilient, prosperous and fair future<sup>20</sup>. The main aim of agreement is to combat climate change and its adverse effects globally in the context of sustainable development and to eliminate poverty. According to the agreement, the global average temperature rise will be kept at 1.5 degrees, in order to increase adaptability to adverse effects of climate change in a manner that does not threaten food production and providing finance flows consistent with a pathway towards low GHGs emissions and climate-resilient development<sup>21</sup>. In addition, all party countries have responsibilities but in different levels<sup>22</sup>. The agreement has both binding and non-binding elements, and it has been recognized by almost all countries and has become one of the most important documents for combating climate change.

### III. THE ADVERSE EFFECTS OF CLIMATE CHANGE ON SUSTAINABLE DEVELOPMENT

The climate change affects the sustainable development goals of the countries negatively. Its adverse effects influence sustainable development from three perspectives: environmental, social and economic<sup>23</sup>. In this chapter, these adverse effects will be addressed in the context of sustainable development.

#### A. Food Production, Security and Land Degradation

The goal 2 of 2030 Agenda for Sustainable Development is to provide healthy and adequate nutrition for all people, especially poor and vulnerable people who are unable to meet their needs, by 2030. For that, states need to end hunger, provide food safety, develop nutrition, and support sustainable agriculture<sup>24</sup>. Climate change has a negative impact on sustainable agriculture, food security and agricultural productivity. By 2050, the world population will

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<sup>20</sup> Juha Ilari Uitto, *Evaluating Climate Change Action for Sustainable Development* (Springer Berlin Heidelberg 2017).

<sup>21</sup> 'Adoption of the Paris Agreement' (n 19).

<sup>22</sup> *ibid.*

<sup>23</sup> Rob Swart, John Robinson and Stewart Cohen, *Climate Change and Sustainable Development: Expanding the Options* (2003) 3 Climate Policy S19. 23

<sup>24</sup> 'Transforming Our World: The 2030 Agenda for Sustainable Development' (n 2) 15.

increase by 2 billion more and it will be very difficult to sustain the agriculture needed to feed this population due to climate change<sup>25</sup>. The extreme drought, floods, heat waves, which emerge as the result of climate change, will cause great damage on the agriculture. In addition, salty water intrusion because of sea level rise emerging due to climate change threatens rich agricultural land, such as the Nile basin, and ocean warming causes a decrease on food<sup>26</sup>. The high temperature has a negative effect on many countries in Asia, Africa, America and Australia. The product yield has fallen considerably, because the temperature needed to cultivate agricultural crops has changed. For instance, in the United States local daily temperatures increased to 29°C for corn cultivation and 30°C for soybeans cultivation<sup>27</sup>. The cropland areas affected by drought are expanding (today 15.4%) and will continue to expand (44% by 2100). In particular, in some areas, the area of cropland is expected to be quite low. For instance, in Africa, 35% of the eligible areas for agriculture will be unfit for farming<sup>28</sup>. As a result; countries are struggling to achieve sustainable agriculture, and food security due to climate change, which is one of the sustainable development goals.

## B. Extreme Weather Events

Climate change leads to many extreme weather events such as drought, floods, storms, wildfire, hurricanes, and heat waves. These extreme weather events cause decreasing of food production and water supply, economic losses, settlement and infrastructure damage, and loss of human health, which are the challenges that the sustainable development aims to overcome<sup>29</sup>. For example, in New Orleans in 2005, Hurricane Katrina caused more than 1,800 deaths and more than \$150 billion of economic damage. The American administration had to spend hundreds of billions of dollars to reconstruct the city<sup>30</sup>. It can be said that, this kind of climate-related extremes resulting from climate change

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<sup>25</sup> Mark Maslin, *Climate Change: A Very Short Introduction* (Third edition, Oxford University Press 2014) 90.

<sup>26</sup> Joseph Romm, *Climate Change: What Everyone Needs to Know* (Oxford University Press 2016) 124-5.

<sup>27</sup> Parry and Intergovernmental Panel on Climate Change (n 10).

<sup>28</sup> *ibid.*

<sup>29</sup> *ibid.*

<sup>30</sup> Maslin (n 25) 78.



handicap countries from making the investments necessary for sustainable development and prevents achievement of targets. Similarly, climate change causes global warming in various parts of the world, so droughts are intensified quickly. These droughts have quite serious effects in the local ecosystem, agriculture and livestock, local economy, water resources, human health and safety. In prolonged drought, people cannot get enough clean water, they feed poorly, outbreaks occur, agricultural land becomes unusable, human crises occur and security cannot be ensured<sup>31</sup>. The poor countries and developing countries are much more affected by extreme weather events from climate change because they do not have adequate mitigation and adaptation abilities<sup>32</sup>. Therefore, it leads to an increase in inequality, tackling of which is one of sustainable development goal. Another example is that, by the middle of the century, approximately 200 million individuals can permanently be displaced due to drought, floods and other weather events<sup>33</sup>. It shows that, people will not be able to meet their basic needs such as security, food and health. Under these conditions, it is not possible for countries to achieve sustainable development goals, especially for poor and developing countries, because of the adverse effects of climate change.

### C. Human Health

The goal 3 of 2030 Agenda for Sustainable Development is to guarantee human health and to make necessary measures, training and investments for it. Climate change negatively affects human health in a variety of ways. For instance, it causes the spread of vector-borne diseases through heat waves, and the local air quality to deteriorate<sup>34</sup>. Human deaths and property losses occur due to events such as floods and storms, which are the result of climate change. In addition, high global temperatures negatively affect most people, especially those engaged in agriculture such as farm worker. It causes various difficulties and diseases for people who work outside such as increasing hyperthermia<sup>35</sup>.

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<sup>31</sup> *ibid* 81.

<sup>32</sup> Peter Poschen, *Decent Work, Green Jobs and the Sustainable Economy: Solutions for Climate Change and Sustainable Development* (1st edn, Routledge 2015) 81 <<https://www.taylorfrancis.com/books/9781351283991>> accessed 8 September 2023.

<sup>33</sup> NH Stern, *The Economics of Climate Change: The Stern Review* (Cambridge University Press 2007) 101.

<sup>34</sup> Swart, Robinson and Cohen (n 23) 24.

<sup>35</sup> Maslin (n 25) 82.

According to University College London's Lancet report, climate change is threatening and will threaten millions of people's health through two important areas: food and water<sup>36</sup>. Notwithstanding, the greatest danger for human health is the inadequate clean water supplies. Today, nearly one billion people are not able to meet the need for clean water regularly. The lack of water causes diseases and polluted water plays a major role in the transmission of certain diseases to humans. Climate change has an adverse effect on water resources by affecting temperature, precipitation and sea level<sup>37</sup>. For instance, climate change increases evaporation, changes river and groundwater levels, and thus water resources are reduced.

As mentioned above, the inability to meet basic food need has very negative effects on human health. Drought and weather change resulting from climate change play a negative role in food production. For example, in 2010 Russia banned exports because of the extreme drought in the country due to a very large decline in grain production to meet its own needs<sup>38</sup>. It shows that the negative effects of climate change can affect the economic policies of countries.

As a result, these unfavourable effects of climate change on human health have adversely affected the sustainability goals of states. States are forced to invest more in clean water and adequate nutrition such as creating infrastructural systems, establishing health institutions, and the likelihood of loss of imports and exports. The states spend quite a lot of effort and money for the prevention, treatment and planning of contagious diseases resulting from climate change.

#### **D. Biodiversity**

The goal 15 of 2030 Agenda for Sustainable Development is to protect terrestrial ecosystems, maintenance of forests in a sustainable way, prevent desertification and halt biodiversity loss<sup>39</sup>. At present, the rate of loss of biodiversity is high compared to past because of deforestation all over the world, growth of agricultural areas, increase of urbanization and mineral

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<sup>36</sup> Anthony Costello and others, *'Managing the Health Effects of Climate Change'* (2009) 373 *The Lancet* 1693.

<sup>37</sup> Maslin (n 25) 82.

<sup>38</sup> *ibid* 83.

<sup>39</sup> *'Transforming Our World: The 2030 Agenda for Sustainable Development'* (n 2) 24.

exploitation. The adverse effects of climate change make it worse<sup>40</sup>. For instance, in Amazon rain forest in Brazil, loss of biodiversity is associated with adverse effects of climate change including deforestation, increased temperatures, and expansion of agricultural land. Rain forests, which have a very important position for the world and future generations, are of great importance for sustainable development. According to OECD, if necessary preventive measures and adaptation activities are not carried out, biodiversity in rain forests will continue to decrease and some of animal and plant species will disappear<sup>41</sup>.

In particular, because of the rapid increase in global warming effect and other adverse effects of climate change, it is getting harder for various plant and animal species to adapt<sup>42</sup>. Another example is the coral reefs that are under threat. The economic value of coral reefs is quite high in terms of fishing, tourism, and coastal protection but the loss of coral reefs costs hundreds of millions of dollars each year because of climate change. In addition, coral reefs are very rich in terms of biodiversity, but they are at risk<sup>43</sup>. As a result, states must work on preventing the loss of biodiversity for achievement of the sustainable development. However, this process is both costly and difficult and climate change makes it worse.

### **E. Ocean Acidification, Sea levels and Sea Life**

The rate of acidification in the oceans has increased steadily over the past years. The main reasons are that: increase of carbon dioxide in the atmosphere and the change of the temperature of the oceans caused by climate change. It is predicted that carbon dioxide in the oceans will increase due to climate change by human activities. This is causing the species living in the oceans, such as corals, planktons and shellfish, to be negatively affected<sup>44</sup>. According to researchers, 'it causes extinction of 90% of marine life and disappearing some 70% of land-based animal and plant life.'<sup>45</sup>. The goal 14 of 2030 Agenda for

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<sup>40</sup> Maslin (n 25) 86.

<sup>41</sup> Noreen Beg, '*Linkages between Climate Change and Sustainable Development*' (2002) 2 *Climate Policy* 129, 139.

<sup>42</sup> Romm (n 26) 121.

<sup>43</sup> Maslin (n 25) 87.

<sup>44</sup> *ibid* 93.

<sup>45</sup> Romm (n 26) 119.

Sustainable Development is to protect and use oceans, seas and marine resources in a sustainable way<sup>46</sup>. Therefore, bad effects of global warming cause problems that cannot be compensated in the oceans in terms of sustainable development. The warming and acidification of the water has already adversely affected the life of sea creatures, especially coral reef<sup>47</sup>. According to Veron 'The science is clear: Unless we change the way we live, the Earth's coral reefs will be utterly destroyed within our children's lifetimes.'<sup>48</sup>.

One of the most threatening effects of global warming, which is the result of climate change, is the rise of sea level. According to IPCC, sea level is predicted to increase between 27 and 98 cm by 2100. In particular, melting of the Glacier, Greenland, and Antarctic ices, and thermal expansion are accelerating this situation<sup>49</sup>. Millions of people living on the coast will have to relocate because of the rise in sea level and cities with coasts will be also adversely affected including major cities such as Florida, Shangai and Miami. States will spend a lot of effort and money to prevent and adapt this situation<sup>50</sup>.

Another effect of sea level rise is losing of agricultural land near the seacoasts and facing coastal erosion and flooding. The majority of the population lives in these areas, because the coastal areas are fertile. Therefore, people living these areas face social, economic and health problems<sup>51</sup>. These are serious threats to economic gains and food security<sup>52</sup>.

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<sup>46</sup> 'Transforming Our World: The 2030 Agenda for Sustainable Development' (n 2) 24.

<sup>47</sup> 'IAP Statement on Ocean Acidification; National Oceanic and Atmospheric Administration' <<https://www.interacademies.org/statement/iap-statement-ocean-acidification>> accessed 8 December 2017.

<sup>48</sup> Jen J.E.N. Veron, 'Is the End in Sight for The World's Coral Reefs?' (Yale E360). <[https://e360.yale.edu/features/is\\_the\\_end\\_in\\_sight\\_for\\_the\\_worlds\\_coral\\_reefs](https://e360.yale.edu/features/is_the_end_in_sight_for_the_worlds_coral_reefs)> accessed 8 September 2023.

<sup>49</sup> S Jevrejeva, A Grinsted and JC Moore, 'Upper Limit for Sea Level Projections by 2100' (2014) 9 Environmental Research Letters 104008.

<sup>50</sup> Romm (n 26) 94.

<sup>51</sup> Parry and Intergovernmental Panel on Climate Change (n 10) 17.

<sup>52</sup> Joanne Chong, Pia Treichel and Anna Gero, 'Evaluating Climate Change Adaptation in Practice: A Child-Centred, Community-Based Project in the Philippines' in Juha I Uitto, Jyotsna Puri and Rob D Van Den Berg (eds), *Evaluating Climate Change Action for Sustainable Development* (Springer International Publishing 2017) <[http://link.springer.com/10.1007/978-3-319-43702-6\\_16](http://link.springer.com/10.1007/978-3-319-43702-6_16)> accessed 8 September 2023

## F. Other Adverse Effects

One of the most important goals of sustainable development is eradication of poverty from all over the world<sup>53</sup>. One of the reasons why countries (especially poor countries) combating poverty cannot achieve these goals is climate change. Reduction of food and water resources, destruction of agricultural lands, drought, floods, economic losses and other adverse effects resulting from climate change seriously threaten countries fighting poverty and causes to fail them<sup>54</sup>. In particular, poor and developing countries do not have the investment and financial means in order to prevent the adverse effects of climate change and adaptation activities, poverty is the common point in these countries<sup>55</sup>.

In addition, climate change threatens national, regional, and global security. It will indirectly affect various violent problems including civil war and intergroup violence because of the effects of climate change such as poverty, hunger, and economic crisis<sup>56</sup>. Water and food deprivation, soil loss, infectious diseases, and poverty increase violence in countries and cause security weakness. States struggle to prevent and solve these problems. Failure to resolve these problems despite the efforts will result with increased violence and will cause death and injuries. The most up-to-date example of this is Syria<sup>57</sup>. Between 2006 and 2011, a significant portion of Syria's territory experienced an unprecedented and prolonged drought, leading to a series of severe crop failures. The human and economic consequences of this drought were substantial. According to a 2009 report by the UN, over 800,000 individuals in Syria had lost their means of subsistence due to the drought. Consequently, a significant migration occurred, with people engaged in farming, herding, and agriculture in rural areas moving to urban centres. This massive internal displacement has been one of the contributing factors to the social and political turmoil in Syria. Additionally, there is notable dissatisfaction among communities whose primary source of livelihood is agriculture<sup>58</sup>.

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<sup>53</sup> 'Transforming Our World: The 2030 Agenda for Sustainable Development' (n 2) 15.

<sup>54</sup> Tariq Banuri and Hans Opschoor, 'Climate Change and Sustainable Development' (2007) <<https://digitallibrary.un.org/record/611508?ln=en>> accessed 3 December 2022.

<sup>55</sup> Heemst, J. van, and V. Bayangos (2004). *Poverty and Climate Change*. In: Kok M.T.J. and H.C. de Coninck, 2004: 21-52.

<sup>56</sup> Parry and Intergovernmental Panel on Climate Change (n 10) 20.

<sup>57</sup> Romm (n 26) 128.

<sup>58</sup> Francesco Femia and Caitlin E Werrell, 'Syria: Climate Change, Drought and Social Unrest' (The center for Climate and Security 2012) 11 <[https://climateandsecurity.org/wp-content/uploads/2012/04/syria-climate-change-drought-and-social-unrest\\_briefer-11.pdf](https://climateandsecurity.org/wp-content/uploads/2012/04/syria-climate-change-drought-and-social-unrest_briefer-11.pdf)> accessed 10 October 2023.

Lastly, the impact of climate change on inequality should be addressed. Individuals who are marginalized in terms of gender, class, race, disability, ethnicity, and age are more vulnerable to the adverse effects of climate change because their ability to prevent and adapt to climate change is very low<sup>59</sup>. Moreover, there is an inequality between regions and states in terms of climate change. The goal 10 of 2030 Agenda for Sustainable Development is to eradicate inequality between people and countries. Climate change makes the inequality worse and causes countries to fail to achieve their sustainable development goal.

#### IV. CHALLENGES

As mentioned above, the adverse effects of climate change pose serious threats to sustainable development. Although the importance of sustainable development is accepted by the world, the necessary prevention and adaptation activities are still inadequate. The adverse effects of climate change should be removed for sustainable development, but some challenges prevent it. In this chapter, these challenges will be addressed in the context of sustainable development by showing how to address contemporary challenges.

The first challenge is that although climate change is a global problem, there are no global and binding contracts, instruments and activities to solve it<sup>60</sup>. Although this issue has been addressed on international platforms such as the UNFCCC, the Kyoto Protocol and the Rio Conference, which state all countries need to actively get involved, in practice, most of the countries do not fulfil their responsibilities because of politic and economic reasons<sup>61</sup>. In particular, some developed countries, which cause more in climate change, refuse to reduce the GHGs they produce. For example, the US did not agree to participate in the Kyoto Protocol and refused to reduce GHGs. Even if states accept international agreements, there is no real enforcement to urge them to take the necessary precautions. States that commit to sustainable development through treaties or other international legal instruments have an obligation to balance economic, social, and environmental priorities in their development processes<sup>62</sup>. As a

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<sup>59</sup> Parry and Intergovernmental Panel on Climate Change (n 10) 50.

<sup>60</sup> Sachs (n 12) 2.

<sup>61</sup> Anita M Halvorssen, 'International Law and Sustainable Development - Tools for Addressing Climate Change' (2011) 39 *Denv. J. Int'l L. & Pol'y* 3.

<sup>62</sup> Marie-Claire Cordonier Segger, 'Sustainable Development in International Law' in Hans Christian Bugge and Christina Voigt (eds), *Sustainable Development in International and National Law* (Europa Law Publishing 2008) 182.

result, they may be reluctant to accept binding commitments on climate change. These binding commitments often impose different obligations on developed and developing states<sup>63</sup>. Developed countries face heavier burdens, including the reduction of emissions, the provision of funds, and the transfer of essential technologies. Consequently, they are often opposed to binding commitments on climate change. On the other hand, developing countries are typically resistant to binding commitments that could impede their development or place an additional burden on them.

Secondly, as mentioned above, there is a difference between developed countries that are primarily responsible for climate change and developing countries; therefore they have different responsibilities. This is clearly stated in the Kyoto Protocol. However, developed countries refrain from fulfilling their responsibilities such as reducing the GHGs emissions<sup>64</sup>. It does not mean that developing countries have no responsibility. While they continue their development, they should take into account the adverse effects of climate change for their sustainable development. In doing so, the developed countries should assist the developing countries in various ways such as funding, technology, information and capacity-building because they do not have adequate economic and technologic powers. However, they avoid helping them due to economic, political, and other reasons<sup>65</sup>. Economic reasons outweigh at this point. For example, the cost of developing poor countries by considering climate change is between 25 and 30 per cent more. Another example, the cost of developing countries' annual infrastructure is also about 1.2 trillion and 1.5 trillion and requires an annual finance of more than 700 billion dollars for sustainably climate change. To meet the climate and development change, combinations activities are needed such as financial institution, public budget, and international investors<sup>66</sup>.

In addition, developing and poor countries continue their industrial activities and produce GHGs, because their core problems are different such as poverty, water and food needs. According to Maslow, higher needs (such as

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<sup>63</sup> Halvorssen (n 61) 413-4.

<sup>64</sup> Halvorssen (n 61).

<sup>65</sup> *ibid.*

<sup>66</sup> 'Climate Change Is a Challenge For Sustainable Development' (World Bank) <<https://www.worldbank.org/en/news/speech/2014/01/15/climate-change-is-challenge-for-sustainable-development>> accessed 8 September 2022.

climate and environmental problems) are not considered unless physical needs (such as water, food, clothing, shelter) are resolved<sup>67</sup>. Therefore, they continue their activities that will cause climate change without considering sustainable development to meet basic needs.

One of the most important challenges of climate change is that GHG emission is at the core of modern economy<sup>68</sup>. Countries have grown using fossil fuel energy that causes climate change. The fossil energy consumption, which started with steam engine and coal, continued with oil and natural gas, and is still continuing. Although fossil energy needs to be replaced by low-carbon energy to solve the climate change problem and to contribute to sustainable development, countries do not make the necessary investments and research due to economic and politic reasons. In addition, the energy sector harbours the most influential corporations globally. Typically, the major oil and gas corporations are among the greatest global companies in terms of revenue such as China National Petroleum, BP and Total<sup>69</sup>. Some of these companies are against policies that restrict the use of oil and gas in order to protect their economic income, and they resort lobbying, economic and political methods for that. For example, in the US, Koch Brothers Company that is a major oil company neither supports climate science nor uses low carbon energy instead of oil<sup>70</sup>.

Another challenge is that the adverse effects of climate change occur in the long term<sup>71</sup>. Some countries and politicians do not give the necessary care because the effects do not appear immediately. However, if mitigation and adaptation efforts are not carried out today, then it may be late in the future. It is likely that the current political and economic decisions of the countries and companies form a great danger to the future. In particular, if increasing world population is taken into account, the size of the effects in the future can be better understood. World population is increasing so sustainable agriculture, prevention of food waste and other measures should be resorted for combating climate change. In addition, it can be said that while future generations are likely

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<sup>67</sup> 'Maslow's Hierarchy of Needs: Definition, Examples & Explanation' (The Berkeley Well-Being Institute) <<https://www.berkeleywellbeing.com/maslows-hierarchy-of-needs.html>> accessed 8 September 2023.

<sup>68</sup> Sachs (n 12) 2.

<sup>69</sup> *ibid* 3.

<sup>70</sup> *ibid*.

<sup>71</sup> *ibid* 2.



to suffer more from the adverse effects of climate change, there is currently no organization or actors that will adequately represent their interests<sup>72</sup>.

## V. CONCLUSION

Today, climate change is one of the dangers that affect the whole world and its adverse effects negatively influence the sustainable development of countries. As mentioned above, how climate change affects sustainable development and the challenges that prevent to solve this problem are essential in order to achieve the goals of sustainable development. In addition, prevention and adaptation activities should be made to eliminate the adverse effects of climate change in the context of sustainable development. As mitigation policies, to collaborate globally to reduce human-induced GHGs, international and binding agreements should be established; participation of all countries should be ensured; policies based on sustainable economics, industry, agriculture, energy and technology should be pursued; people need to be educated about climate change and decision makers should shape their policies accordingly<sup>73</sup>.

There are also adaptation measurements. Firstly policies, such as renewable energy, energy efficiency, low-carbon electricity and sustainable transport, should be implemented to reduce human-induced GHG emissions<sup>74</sup>. Secondly, adaptation measurements should be carried out in order to reduce the carbon level in all areas such as agriculture, land use, fisheries. Thirdly, improving the infrastructure, education of public health, providing adequate food and water access should be enabled<sup>75</sup>. In addition, using a special taxation for the use of fossil fuels or carbon and cap-and-trade system for GHG can be effective<sup>76</sup>.

As a result, if countries and people do not make the necessary mitigation and adaptation to prevent the adverse effects of climate change, achieving sustainable development goals becomes very difficult. Therefore, people and especially future generations will suffer of it.

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<sup>72</sup> *ibid.*

<sup>73</sup> Swart, Robinson and Cohen (n 23) 29-33.

<sup>74</sup> Sachs (n 12) 36.

<sup>75</sup> Swart, Robinson and Cohen (n 23) 33-35.

<sup>76</sup> Thomas Pfister, Martin Schweighofer and André Reichel, *Sustainability* (Routledge 2016) <<https://www.taylorfrancis.com/books/9781134688050>> accessed 8 September 2023.

**BIBLIOGRAPHY****Books and Articles**

- Banuri T and Opschoor H, 'Climate Change and Sustainable Development' (2007) <<https://digitallibrary.un.org/record/611508?ln=en>> accessed 3 December 2022
- Beg N, 'Linkages between Climate Change and Sustainable Development' (2002) 2 Climate Policy 129
- Chong J, Treichel P and Gero A, 'Evaluating Climate Change Adaptation in Practice: A Child-Centred, Community-Based Project in the Philippines' in Juha I Uitto, Jyotsna Puri and Rob D Van Den Berg (eds), *Evaluating Climate Change Action for Sustainable Development* (Springer International Publishing 2017) <[http://link.springer.com/10.1007/978-3-319-43702-6\\_16](http://link.springer.com/10.1007/978-3-319-43702-6_16)> accessed 8 September 2023
- Costello A and others, 'Managing the Health Effects of Climate Change' (2009) 373 The Lancet 1693
- Halvorssen AM, 'International Law and Sustainable Development - Tools for Addressing Climate Change' (2011) 39 Denv. J. Int'l L. & Pol'y
- Heemst, J. van, and V. Bayangos (2004). Poverty and Climate Change. In: Kok M.T.J. and H.C. de Coninck, 2004: 21-52
- Jevrejeva S, Grinsted A and Moore JC, 'Upper Limit for Sea Level Projections by 2100' (2014) 9 Environmental Research Letters 104008
- Maslin M, *Climate Change: A Very Short Introduction* (Third edition, Oxford University Press 2014)
- Pachauri RK, Mayer L and Intergovernmental Panel on Climate Change (eds), *Climate Change 2014: Synthesis Report* (Intergovernmental Panel on Climate Change 2015)
- Parry ML and Intergovernmental Panel on Climate Change (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press 2007)
- Pfister T, Schweighofer M and Reichel A, *Sustainability* (Routledge 2016) <<https://www.taylorfrancis.com/books/9781134688050>> accessed 8 September 2023
- Poschen P, *Decent Work, Green Jobs and the Sustainable Economy: Solutions for Climate Change and Sustainable Development* (1st edn, Routledge 2015) <<https://www.taylorfrancis.com/books/9781351283991>> accessed 8 September 2023
- Romm J, *Climate Change: What Everyone Needs to Know* (Oxford University Press 2016)
- Sachs J, *The Age of Sustainable Development* (Columbia University Press 2015)

Segger Marie-Claire Cordonier, 'Sustainable Development in International Law' in Hans Christian Bugge and Christina Voigt (eds), *Sustainable Development in International and National Law* (Europa Law Publishing 2008)

Stern NH, *The Economics of Climate Change: The Stern Review* (Cambridge University Press 2007)

Swart R, Robinson J and Cohen S, 'Climate Change and Sustainable Development: Expanding the Options' (2003) 3 *Climate Policy* S19

Uitto JI, *Evaluating Climate Change Action for Sustainable Development* (Springer Berlin Heidelberg 2017)

### **Conventions**

'Adoption of the Paris Agreement' (2015) <<https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>> accessed 8 April 2018

'IAP Statement on Ocean Acidification; National Oceanic and Atmospheric Administration' <<https://www.interacademies.org/statement/iap-statement-ocean-acidification>> accessed 8 December 2017

'Kyoto Protocol to the United Nations Framework Convention on Climate Change' (1998) <<https://unfccc.int/resource/docs/convkp/kpeng.pdf>> accessed 20 November 2021

'Our Common Future, Chapter 2: Towards Sustainable Development - A/42/427 Annex, Chapter 2 - UN Documents: Gathering a Body of Global Agreements' <<http://www.un-documents.net/ocf-02.htm>> accessed 8 September 2023

'The Rio Declaration on Environment and Development (1992)' (6 August 2017) <[https://www.iau-hesd.net/sites/default/files/documents/rio\\_e.pdf](https://www.iau-hesd.net/sites/default/files/documents/rio_e.pdf)>

'Stockholm Declaration on the Human Environment' (5 June 2018) <<https://wedocs.unep.org/bitstream/handle/20.500.11822/29567/ELGP1StockD.pdf>>

'Transforming Our World: The 2030 Agenda for Sustainable Development' <[https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A\\_RES\\_70\\_1\\_E.pdf](https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf)> accessed 21 December 2017

'United Nations Framework Convention on Climate Change: Resolution / Adopted by the General Assembly' (1994) <<https://digitallibrary.un.org/record/180257?ln=en>> accessed 6 May 2022

'United Nations Millennium Declaration' <[https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A\\_RES\\_55\\_2.pdf](https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_55_2.pdf)> accessed 5 July 2021

'World Summit on Sustainable Development: Resolution / Adopted by the General Assembly' <<https://digitallibrary.un.org/record/482206?ln=en>> accessed 8 August 2023

**Websites**

'Climate Change Is a Challenge For Sustainable Development' (*World Bank*)  
<<https://www.worldbank.org/en/news/speech/2014/01/15/climate-change-is-challenge-for-sustainable-development>> accessed 8 September 2022

Femia Francesco and Werrell Caitlin E, 'Syria: Climate Change, Drought and Social Unrest' (The center for Climate and Security 2012) 11  
<[https://climateandsecurity.org/wp-content/uploads/2012/04/syria-climate-change-drought-and-social-unrest\\_briefer-11.pdf](https://climateandsecurity.org/wp-content/uploads/2012/04/syria-climate-change-drought-and-social-unrest_briefer-11.pdf)> accessed 10 October 2023.

J.E.N. Veron Jen, 'Is the End in Sight for The World's Coral Reefs?' (*Yale E360*)  
<[https://e360.yale.edu/features/is\\_the\\_end\\_in\\_sight\\_for\\_the\\_worlds\\_coral\\_reefs](https://e360.yale.edu/features/is_the_end_in_sight_for_the_worlds_coral_reefs)> accessed 8 September 2023

'Maslow's Hierarchy of Needs: Definition, Examples & Explanation' (*The Berkeley Well-Being Institute*) <<https://www.berkeleywellbeing.com/maslows-hierarchy-of-needs.html>> accessed 8 September 2023