THE LAST GENERATION

Fachruddin M. Mangunjaya

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THE LAST GENERATION

Muslim world activism prevents climate change and ecological extinctions

Introduction:
Prof. Dr. KH Nasaruddin Umar, MA (Grand Imam of the Istiqlal Mosque)

LP3ES

Indonesian National Library:

Cataloguing in Publication

Fachruddin M Mangunjaya

The Last generation: Muslim World Activism Prevents Climate Change and Ecological Extinctions / Fachruddin M Mangunjaya. - Depok: Pustaka LP3ES (Lembaga Penelitian, Pendidikan, dan Penerangan Ekonomi dan Sosial), 2021.
xxii + 234 pages.; 23 cm

ISBN 978-602-7984-68-4
1. Sociology.of Islam I. Title
297.614 11

This publication was made possible through the support of Grant 62105 from the John Templeton Foundation. The opinions expressed in this publication are those of the author and do not necessarily reflect the views of the John Templeton Foundation.

First issue, June 2021
LP3ES publisher, IKAPI
MEMBER
Jl. Pangkalan Jati No. 71
Cinere, Depok - 16513
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This book was translated by the Language Platform and proofread pro-bono

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Recite in the name of your Lord Who created, created man from a clot of congealed blood. Recite: and your Lord is Most Generous,
Who taught by the pen, taught man what he did not know.
(Surah Al-Alaq, 96:1-5)

For my father,
Tuan Guru Mohammad Majeri Mat Seman Al Banjari

Foreword

Bismillahirrahmanirrahim.

All praise is due to Allah, the Ruler of nature, the Ruler of all affairs, the Creator Who provides pleasures to all His creatures. The Qur'an was revealed to humankind as a guide. Salawat and greetings may always be addressed to the Prophet Muhammad SAW and His family until the end of time. Prophet Muhammad SAW, the messenger, had a great and commendable character.

Islam begins its teachings with *iqra* (read) (Qur'an 96:1-5). I hope that this book will provide a memorable reading experience. This book contains the verses of Allah SWT from the Qur'an as well as the verses of kauniyah (universe) from nature, earth, water, sea, rivers, fauna and flora, the atmosphere, and all of Allah's other creations, which are currently suffering from climate change.

Muslims will be very upset if one verse in the text of the Qur'an is missing. But scores of Allah's verses in the universe have gone extinct; and yet no one has protested! Humans have corrupted the verses of kauniyah: species, ecosystems created by Allah to promote human welfare.

This book presents the instructions of the Qur'an on the way humans should glorify the creation of Allah SWT. Therefore, the contents of this book are the elaboration of practical knowledge and Islamic scientific theory.

The writing process was a lengthy and extensive endeavor. That is because it documents the journey of activism and the development of the environmental conservation and climate change movement, which is a relatively recent science developed in the 20th century. While adopting an unsophisticated writing style, this book delivers complex approaches to that science.

Climate change is a contemporary environmental phenomenon which might not have been predicted by the previous *faqih*. Nevertheless, environmental challenges are consistent with the verses on nature described in the Qur'an. The Qur'an describes environmental damage caused by human hands. It also sets out critical guidelines regarding nature and its essential characteristics, such *as al mizan* (balance), *al qadr* (size) and others, which we can derive lessons from.

This book explores the understanding of the changing balance on earth. Allah SWT has created a balance, and humans on this planet earth have corrupted the measures of that balance. We should therefore consider the implications of the global damage on Islamic countries.

This begs the question: Is the Islamic world silent? Are Muslims eager to observe natural phenomena and relate them to their beliefs as Muslims?

This book is the antidote to those questions. The Islamic world is a subculture of modernization and secular civilization*

Our belief teaches the Qur'an as an remarkable revelation bringing people from darkness into light. Knowledge of the Qur'an is evident when it is seen in practice.

I would like to thank Dr. KH Husein Muhammad, head of Pesantren *Dar al Tauhid* Cirebon, who was willing to read and review this book, especially Chapter 2. This book has many shortcomings that may not fulfill the reader's quest for knowledge. However, at the very least it provides an understanding of the position of humans as successors on earth.

This book is essential as a practical basis for understanding the science behind the climate crisis, especially in the Islamic world. As a strategic part of the Islamic world and as the country with the largest Muslim population in the world, Indonesia also has a wealth of natural resources and significant challenges in managing the climate and environment.

In the last five years, the Center for Islamic Studies (PPI) of Universits Nasional, where I work, has developed activities for environmental improvement nationally and internationally. I am grateful for the support of Grant 62105 from the John Templeton Foundation, entitled "*Strengthening the Integration of Islam and Environmental Science in Islamic Boarding Schools through the Ekopesantren Program.*" The opinions expressed in this publication are those of the author(s) and do not necessarily reflect the views of the John Templeton Foundation.

I hope this book provides valuable knowledge and insight into the relationship of Muslims to nature and to Allah. Moreover, I hope that the book carries goodness and blessings to all. Amen.

Wallahu'alam,
Bogor, 5 Ramadhan 1442H/April 18, 2021

* According to *Encyclopedia Britanica*, "Secularism is any movement in society directed away from otherworldliness to life on earth. In other words, to be 'secular' means not to believe in anything other than reason and fact that can be proven by the senses."
(https://www.britannica.com/ topic/secularism)

Introduction: Environmental Challenges and the Role of Muslims

Prof. Dr. KH Nasaruddin Umar, M.A. Grand Imam of the Istiqlal Mosque

Since it was revealed in the 6th century, the Qur'an has addressed humans as the creatures that demolish the earth. Angels opposed the cosmic drama of human creation because they believed humans would corrupt and shed blood on earth. The scent of masculinity was powerful in the cosmic drama. Even more emphatically, since the 6th century, the Qur'an has highlighted that human activities damage the earth. The damage is visible on land and sea.

At the same time, the Qur'an shows that one of the objectives of human creation is to improve earth. Although the earth and the universe are subdued (*taskhir*) for the benefit of humans, humans are also responsible for restoring them. In the context of religion, Islam has offered *Fiqh al-Biy'ah* (Environmental Fiqh), which provides solutions for the conservation of nature (*ishlahu-ha*) based on religious principles. In this context, Islam shows that humans are responsible for preserving nature for future generations and offering solutions to the destruction of nature caused by humans.

The most crucial challenge for humankind in the future will be the environmental crisis. Muslims, of whom there are more than 1.8 billion people, are part of the inhabitants of planet earth. Indonesia has the largest Muslim population in the world. It is also blessed with extraordinary natural resources in quantity and quality. Hence, Indonesia should take an active role in protecting its environment.

Recently, changes in the environment have resulted in a dilemma: the loss of of our Earth's balance. This was triggered by the overexploitation of natural resources, environmental pollution by industrial and human activity, a decrease in soil fertility and the loss of land balance, resulting in landslides and flash floods which threaten our lives. In Indonesia, almost every year we encounter an increasing number of disasters caused by environmental damage, such as floods and landslides.

Even more daunting is the fact that global climate change has become a reality. This situation concerns us all, hence the importance of this book and its provocative title: *The Last Generation: Muslim World Activism Prevents Climate Change and Ecological Extinction.*

We do not know much about how many parts of the world, especially the Muslim world, are facing the environmental crisis and climate change. This book will broaden our global knowledge of the efforts by Muslims, especially activists and scholars from Muslim countries, to be actively take part in the struggle to overcome environmental damage.

This book will show that Muslims should be more vigilant in their use of natural resources. The moral message of religion is the same as the principles advocated by the environmental movement, such as: frugality, lack of extravagance or excess, protection of and respect for Allah's creation, and prevention of damage.
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Prophet Muhammad SAW explained the reward for the good deeds in this world, which can be as simple as picking up thorns on the road. The Prophet also forbade Muslims to waste resources, such as water, even if they were in the middle of a flowing river, and He prohibited them from oppressing all living creatures, such as animals, which are another creation of Allah. Moreover, this Earth is a mosque for Muslims.

I warmly welcome the publication of this book. In particular, this book discusses several environmental programs supported by the Istiqlal Mosque, such as the eco-mosque (ekomasjid) program, the water-saving movement, and the eco-friendly pilgrimage. Istiqlal set an example by using clean energy from the sun through solar panels. This year, the Istiqlal Mosque installed 506 solar panels with a total power capacity of 150,000 watts to support the mosque area's electricity needs. This mosque calls upon Muslims to be grateful for the blessings of Allah SWT.

Environmental protection activities abound all around us. Opportunities to improve the environment should be one of the goals in doing *amar ma'ruf*, as well as preventing damage. In addition, measures to restore the environment, such as preventing forest fires, planting trees, and keeping rivers clean from pollution can represent acts of kindness (good deeds). Preserving the environment is critical for the sustainability of the future of our children and grandchildren.

Our religious life will not be sustainable, and our nationality will not continue, without a massive environmental carrying capacity. This book provides a perspective on how Muslims preserve the environment.
Wassalamualaikum wr. wb.

Prologue:
From Istanbul to Planet Earth

This book is based on a reflection on the long journey and the odyssey of activism. I am involved in the development — and active in various dialogues with Muslim scholars and academics — of environmental conservation and climate change in different regions of the world.

As an environmental activist, I wish to find religious and ideological reasons for devoting my life to understanding nature and the environment according to Islamic teachings. I believe this is the duty of the noble "succession on earth" and a legacy of the Islamic teaching of rahmatan lil 'âlamîn (mercy for all creation). Grace is delivered to humans and other animate creatures (fauna and flora, biotic and abiotic), and all kinds of minerals as well as all of Allah's inanimate creations. In this context, Chapter 1 discusses "Islamic Epistemology and Sustainable Development," which is an important basis for Muslim environmental activism. This topic is also reviewed in greater detail in Chapter 3, "Ecology and Climate from the Perspective of Islamic Science." This part is also a Malay language chapter in a book entitled: *Islam dan Kelestarian Alam* published by Institute Kefahaman Islam Malaysia/ Institute of Islamic Understanding Malaysia (IKIM). It was written as part of my assignment as a Visiting Fellow at IKIM in 2018-2019.

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The presence of modern humans on planet earth carried major changes in a relatively short time - a few centuries. Planet Earth has been severely affected by the environmental crisis. The longevity of human existence and civilization has been under threat. At the beginning of 2020, the world was hit by the Coronavirus Disease 2019 (Covid-19), a pandemic that impacted more than 215 countries, with 11 million people infected.[1] *The Guardian* (a British daily newspaper) released Jane Goodal's opinion that Humanity will be "finished" if humans fail to revise food systems significantly in response to the coronavirus pandemic and the climate crisis:

> *"She blamed the emergence of Covid-19 on the over-exploitation of the natural world, which has seen forests cut down, species made extinct and natural habitats destroyed."*[2]

Human civilization may very well be lost, powerless, crippled, and damaged due to the disharmonious relationship between humans and nature that has exceeded the environment's carrying capacity. Humans have exceeded the planet's carrying capacity, the biocapacity, which naturally supports life and restores itself. Humans rule the earth greedily. Some people's lifestyle revolves around filling their stomachs and eating food that civilized humans should not eat![3]

1. https://www.worldometers.info/coronavirus/ retrievedJuly 5, 2020.
2. https://www.theguardian.com/science/2020/jun/03/jane-goodall-humanity-is-finished-if-it- fails-to-adapt-after-covid-19.
3. Gugah Praharawati & Fachruddin Mangunjaya, wrote an essay on wildlife trade and the Coronavirus, noting that the culprit of the pandemic was wildlife trade. See *Koran Tempo*. https://kolom.tempo.co/read/1315645/virus-corona-dan-perdagangan- satwa-liar.

Our environmental condition, or ecology, faces a dilemma. We humans only live on one earth, but, whether consciously or not, we have contributed to its damage. Once again, this book seeks to find answers to these problems, through both epistemology (the theory and nature of science) and praxis in various Muslim countries.

You will find many ironies in the condition of Muslims amid the challenges of climate change, politics, and the dilemma of living a prosperous life. Therefore, this book will discuss in great detail the Islamic world and its institutional actions in responding to global environmental and climate change challenges.
In October 2008, I was invited to a symposium discussing the theme of Islam and the Environment at the Oxford Center for Islamic Studies (OXCIS), England. The symposium brought together thirty- five scientists, policymakers, and activists. Among them were Mustafa Kamal, Chief Justice of Bangladesh Supreme Court, Dr. Khalid M Al-Mathkoor Chairman, The Higher Committee for *Sharia* and Advisor to the Sultan of Kuwait, and Dr. K S Jomo, Assistant Secretary-General for Economic Development, UN. We gathered in Ditchley Park, UK, a gorgeous classic European-style mansion and one of the 'Great Houses of England', used for world-class dialogue and peace negotiations.[4]

This meeting yielded critical documents and recommendations on exploring and applying Islamic teachings for the protection of the environment. A few months after the meeting, HRH Prince Charles gave a lecture on Islam and the Environment. His public speech was an interesting explanation of the Qur'an, nature, awareness and the need to pass on a decent life to the next generation, because humans are like guests who will eventually depart the Earth:

"From what I know of the Qu'ran, again and again it describes the natural world as the handiwork of a unitary benevolent power. It very explicitly describes Nature as possessing an "intelligibility" and that there is no separation between Man and Nature, precisely because there is no separation between the natural world and God. It offers a completely integrated view of the Universe where religion and science, mind and matter are all part of one living, conscious whole. We are, therefore, finite beings contained by an infinitude, and each of us is a microcosm of the whole. This suggests to me that Nature is a knowing partner, never a mindless slave to humanity, and we are Her tenants; God's guests for all too short a time."[5]

4. The following is a list of Muslim scholars and academics, representatives of Islamic countries who work towards environmental wellbeing: Dr Khalid M Al-Mathkoor Chairman, The Higher Committee for *Sharia*, Kuwait (penasihat sultan); Shaikh Khalid A Alireza, Executive Director, Xenel Industries, Kingdom of Saudi Arabia; HE Dr Abdulaziz; Dr Mahmoud Akef, Earth Mates; Professor Rais Akhtar Jawaharlal Nehru University, India; Professor Rafid Al Khaddar, Faculty of Technology and Environment, Liverpool John Moores University; HE Dr Abdul Rahman Al-Awadi Executive Secretary, ROPME; Professor Osman bin Bakar, Centre for Civilization Dialogue, University of Malaya; Mr Richard Beeston, The Times; HE Mohammed Ahmed Al Bowardi, Managing Director, Abu Dhabi Environment Agency; HE Sayyid Hamoud bin Faisal Al Busaidi, Minister of Environment and Climate Affairs, Oman; Mr Bruce Clark,,*The Economist*; Professor Mike Edmunds, School of Geography, Oxford University; Dr Abdul Karim El-Eryani, Political Advisor of the President, Yemen Arab Republic; Dr Shahridan Faiez, The World Bank; Dr Manar Fayyad Director, Water and Environment Research and Study Center, University of Jordan; HE Shaikh Dr Ali Gomaa, Mufti of Egypt; Dr Safei-Eldin Hamed, Texas Tech University, USA; HE Sayed Ali Al-Hashimi, Advisor to the President of the UAE; Professor Salim Al- Hassani, Foundation for Science Technology and Civilisation, UK; Professor Mohamed Hyder (Emeritus Professor), University of Nairobi; Mr Othman Abd-ar Rahman Llewellyn, National Commission for Wildlife Conservation and Development, Kingdom of Saudi Arabia; Mr Fachruddin Mangunjaya, Environmentalist, Jakarta, Indonesia; HE Mr Majed Al Mansouri, Secretary-General, Environment Agency of Abu Dhabi; Mr Michael McCarthy, *The Independent*; Dr Basil Mustafa, Nelson Mandela Fellow, Oxford Centre for Islamic Studies; Dr Mohammad Akram Nadwi, Research Fellow, Oxford Centre for Islamic Studies; Professor Ibrahim Saleh Al- Naimi, Chairman, Doha International Center for Interfaith Dialogue; Mr Martin Palmer, Secretary-General, Alliance of Religions and Conservation, UK; Dr Ali Al Qaradaghi, University of Qatar; Sir Crispin Tickell, Director, Policy Foresight Programme, James Martin Institute for Science and Civilization, Oxford University; Dr Mahmood Yousif Director of Research, Kuwait Foundation for the Advancement of Science; Dr M Anas Zarka, The International Investor, Kuwait, dan beberapa lagi yang tidak tercatat.
5. A speech by HRH The Prince of Wales titled Islam and the Environment, Sheldonian Theatre, Oxford, 9 June 2010.
https://www.princeofwales.gov.uk/speech/speech-hrh-prince- wales-titled-islam-and-environment-sheldonian-theatre-oxford.

In 2009, Islamic scholars assembled in Istanbul and established a symposium on Islam and the Environment, where Muslim 7 Year Action Plan on Climate Change (M7YAP) was declared. At that forum, I met influential people and respected religious leaders such as Dr. Yusuf Al Qardhawi (Chairman *of the International Union of Muslim Scholars*) and Dr. Ali Jum'a (the Mufti of Egypt). Also in attendance were important religious leaders, including Dr. Ekrama Sabri (the Mufti of al-Aqsa, Palestine), Dr. Salman Alouda (a prominent Saudi Arabian scholar), Ali Mohamad Hussein F*Adl*allah (a Lebanese Shiah scholar). Dr. Yusuf Qardhawi delivered a presentation on Islam and environmental management, and he disseminated his book *Himayah al Biah fi Syari'a al Islam* -Environmental Protection in Islam - to the conference participants.

The M7YAP (2009) is an initiative by civil society, or so-called non-state actors, and non-Muslim NGOs. The implementor is the Earth Mates Dialogue Center (EMDC), UK. The original initiator was the Alliance of Religions and Conservation (ARC), which tried to mobilize all religions to respond to the challenges brought by climate change and the potential crises facing humanity. The ARC is a secular organization that sees religion as a moral force supporting environmental actions because faith has the power to move the hearts and minds of people.[6]

Following the announcement in Istanbul, Indonesia proactively welcomed the initiative and hosted the M7YAP implementation effort. The Muslim Conference on Climate Change Actions (MCCA) was held in Bogor in April 2010, which resulted in the Bogor Declaration on Climate Change. The conference was supported by the KEHATI Foundation and chaired by Ismid Hadad, who also saw the great potential of the Indonesian Muslim movement in environmental action.[7]

As is known, a conference generates many thoughts, various ideas and policy recommendations. However, the results may only be evaluated a few years after their implementation. This meeting, supported by a massive amount of funds, must produce valuable results. This endeavor must not go in vain. M7YAP is a valid effort and plan.[8] The document serves as an aspiration and affirmation of the importance of action, as contained in Chapter 5 of this book.

M7YAP calls upon civil society activists to take action and implement it. The actions taken by various countries, such as state actors conducting negotiations and repeatedly holding conferences attended by the signatory countries to the climate agreement (COP-UNFCCC), have sometimes failed, despite the extensive negotiations and years of effort.

In 2015, six years after the launch of M7YAP, we returned to Istanbul. On 18 August 2015, the Islamic Declaration on Global Climate Change was announced. This declaration supports the Paris Agreement, which was promulgated in September of the same year. Chapter 3 of this book contains a brief overview of the points of the Islamic Declaration on Global Climate Change, which is linked to an Islamic perspective on ecology and climate.

6. See Martin Palmer and Vinlay. *Religion and Conservation* (Washington, DC: The World Bank, 2003).
7. See: Report, Muslim Conference on Climate Action, 11 April 2020.
https://www.academia.edu/2084876/Muslim_Conference_on_Climate_Change_Action_Bogor_10-11_April_2010.
8. Some of these are summarized in Chapter 5 of this book.

The Paris Agreement carried revived optimism; each country committed to limit emissions and even set a target to reduce emissions through Nationally Determined Contributions (NDC).[9]

Moreover, scientists warn that the world's inhabitants only have 12 years to ensure global temperatures do not rise more than 1.5 degrees above pre-industrial levels. If temperatures rise by even half a degree more, the risk of drought, floods, extreme heat and poverty will affect hundreds of millions of people. Various scientific reports continue to deliver severe warnings for humans not to take climate hazards lightly. In October 2018, the Panel of Climate Scientists (IPCC) published a report urging actors to make extraordinary efforts to achieve the Paris Agreement's targets and to keep temperature increases below 1.5 and 2 degrees. That is because a temperature increase of more than 1.5–2 degrees since industrial times is a danger to life.[10]

Today, the earth's average temperature has risen by 1 degree compared to pre-industrial times. If temperatures rise a further 0.5 degrees, the total will be 1.5 degrees. Therefore, there must be an effort to prevent global temperatures from rising by 1.5 degrees. Efforts to keep temperatures from rising can prevent the death of coral reefs and reduce pressure in the Arctic, which is already melting. The agreement to contain rising temperatures to a maximum of 1.5 degrees was agreed upon at the plenary session of the IPCC panel of 195 scientists in Incheon, South Korea, in 2018.

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In Chapter 5, this book notes explicitly the actions of the Islamic world, including in Indonesia, a country with multiple ethnic groups, to address climate change. This chapter presents the climate paradoxes that have hit the member states of the Organization of Islamic Cooperation (OIC), such as the climate crisis triggering the war in Syria and the drought in Egypt affecting the downfall of the government of President Hosni Mubarak. The climate crisis also resulted in a political crisis and in the vulnerability of Islamic countries. Moreover, this crisis also threatens the spiritual symbols of Muslims: Unfortunate hajj participants were crushed by a crane during the expansion of the Al Haram Mosque, due to a storm that hit Saudi Arabia. Other recorded climate events in the Islamic world are climate change in the Middle East, which is marked by seasonal anomalies and abundant rain causing floods, desert storms, and even snow. Also, in Uzbekistan, the Aral Sea, which has dried up, has partly become a barren land. Accordingly, the prosperity of fisheries and marine products in that region has become a distant memory.

9. NDCs are at the heart of the Paris Agreement and are the achievement of these long-term goals. NDCs embody efforts made by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement (Article 4, paragraph 2) requires each Party to prepare, communicate and maintain successive nationally determined contributions (NDCs) that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions. See: https:// unfccc.int/process-and-meetings/the-paris- agreement/the-paris-agreement/nationally- determined-contributions-ndcs.

10. IPCC, 2018: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related 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 [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/ SR15_Full_Report_High_Res.pdf.

The collective action of Muslims at the state and national levels are in response to technocratic policies by OIC countries and their leading implementation institutions such as the Islamic Educational, Scientific and Cultural Organization (ISESCO) and Statistical, Economic and Social Research and Training Center for Islamic Countries (SESRIC).

Chapter 4 discusses the Islamic world's response to environmental action, from policy making to real action. The chapter also talks about actions that the community may use as examples to carry out environmental and climate activities. Chapter 6 provides wisdom regarding the need for an ethical and moral lifestyle. It also provides insights and lessons drawn from the Covid-19 pandemic that has affected the entire world.▪

Chapter 1
Islamic Epistemology and Sustainable Development

This is the Blessed Book that We have revealed to you, (O Muhammad), that people with understanding may reflect over its verses and those with understanding derive a lesson.
(Surah Sad, 38:29)

Introduction

Albert Einstein wrote a letter on his belief that religion would be the pillar of the triumph of science for humanity and civilization. He penned: "*Science without religion is lame, religion without science is blind.*"[1]

The current environmental imbalance and problems are due to the fact that science is separated from religious principles. In fact, these principles prevent fatal "paralysis" of human civilization. The increasing environmental catastrophes caused by the high rate of environmental damage are because religion as an ethical and moral norm has been deserted by humans.

The use of science and technology that is not based on religion leads to hedonic behavior, the endless search for worldly satisfaction, ignorance of the consequences, violation of the ethics of common decency and lack of human empathy. Therefore, science that integrates religious understanding has an essential role. Religious principles ought to be the pillars enriching the integrity of Islamic scientists from the philosophical level to the policy and practical levels.

A Muslim should be grateful that the Quran is a miracle. The sanctity of the Quran is an important foundation for the development of knowledge. Muslims should view the knowledge they have acquired without a dichotomous understanding of knowledge and religion. This is because the Quran is a book of guidance for humans, of clear proofs of guidance, and of the Criterion (of right and wrong) (QS.2:185).

* Replication of article published in Jurnal Theologia, Vol.26 (1) 2015 (Semarang: UIN Walisongo).
1. "Childish superstition: Einstein's letter makes view of religion relatively clear".
http:// www.theguardian.com/science/2008/may/12/peopleinscience.religion

Nearly 15 centuries ago, the Quran was revealed; it is the only revelation that has been tested and has proven its miracles, many of which have been evidenced by scientific discoveries in modern times. Maurice Bucaille, a surgeon, described the indisputable miracles of the Quran:

> "Bucaille says that Islam, science and religion have always been 'twin sisters'. According to Bucaille, there are monumental errors of science in the Bible and not a single error in the Qur'an, whose descriptions of natural phenomena make it compatible with modern science."[2]

The Quran is a "futurist" resource, predicting future events, and some predictions have become history. The history of the conquest of Byzantium (Eastern Rome), which was a medieval superpower (1453 AD), was predicted by Surat ar-Ruum (30:1-2) and also by the hadith of Prophet Muhammad:

> "Verily, you shall conquer Constantinople. What a wonderful army will that army be, and what a wonderful commander will that conqueror be." (Hadith by Ahmad bin Hanbal Al-Musnad 4/335)

Hence, Muslims have strong guidelines and instructions, which not only must be relied upon but which must become the basis of seeking knowledge (epistemology), so that the truth of the Qur'an becomes a light for humans and Muslim scientists amid darkness and confusion.

Another superior aspect of the Quran is the claim that the earth and the heavens are signs for men of understanding (Ali Imran:190).

> "Surely in the creation of the heavens and the earth, and in the alternation of night and day, there are signs for men of understanding. Those who remember Allah while standing, sitting or (reclining) on their backs, and reflect in the creation of the heavens and the earth, (saying): 'Our Lord! You have not created this in vain. Glory to You! Save us, then, from the chastisement of the Fire." (Surah Ali Imron, 3:190-191).

Ibn Kathir defined the creation of Allah as follows;

> "... refers to the high heaven, the vast realm of the earth, the planets revolving around the desert sun, trees, plants, fruits, animals, metals, and various favorable colors, aromas, flavors, and elements. (the verses .... *and think about the creation of the heavens and the earth*), contemplate the signs in the heavens and the earth and are signs of the greatness, omnipotence, knowledge, love, and wisdom of Allah. Allah criticizes those who do not observe His creation, which proves His existence, attributes, *Shari`ah*, His decrees and verses: "How many are the signs in the heavens and the earth which people pass by without giving any heed! And most of them believe in Allah only when they associate others with Him in His Divinity." (Surah Yusuf, 12:105-106)."

2. http://en.wikipedia.org/wiki/Maurice_Bucaille Bucaille.

It is evident and apparent that Ibn Kathir, an expert of tafsir, also agreed that creation, the heavens, the earth, and all that is in it, are signs of the power of Allah SWT as found on earth where humans and other creatures exist. So, if the earth as His creation - the verses of Allah SWT - becomes damaged and causes many disasters, then all of that is *sunnatullah* due to human negligence. Therefore, it is time for Muslim scientists to return to the guidance and superiority of the Quran.

Environmental Degradation

The environment is in deterioration. Such damage is rooted in an imbalance of excessive human intervention. This environmental damage prompted world leaders to hold the United Nations Conference on Environment and Development (UNCED), the 'Earth Summit,' in Rio de Janeiro, Brazil, in 1992, to discuss the earth's future. After the Earth Summit, three important conventions were established that bind various nations on earth to act for this planet's safety. These conventions include: (1) UNFCCC: United Nations Framework Convention on Climate Change; (2) UNCBD: United Nations Convention on Biological Diversity and (3) UNCCD: United Nations Convention to Combat Desertification. These three conventions became legally binding for many countries which ratified (adopted) them into law. Of the three conventions, UNCBD and UNFCCC are the world's (binding) environmental regulations and are the most frequently negotiated. From November to December 2013, the Conference of Parties (COP)-19/CMP-9 climate change negotiations were held, followed by the signatory member countries of the convention session in Warsaw, Poland. Meanwhile, UNCBD held COP-12 negotiations in 2014 in Korea. UNFCCC aims for all nations to reduce atmospheric pollution from greenhouse gases (GHGs). The six Greenhouse Gases (GHGs) contributing to Global Warming that were discussed at UNFCC are carbon dioxide (CO2), methane (CH4), nitric oxide (N2O), and fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). Of the six greenhouse gases, carbon dioxide takes the most considerable portion, around 75 percent. Therefore, the amount of GHGs is always equated with the CO2 content in the atmosphere.

Climate change has constantly been observed scientifically by numerous scientists from multiple countries, based on scientific reports called Assessment Reports (AR). A team of UN experts, members of the Intergovernmental Panel on Climate Change (IPCC), provides technical reports to the UN and to the public on global climate change. The IPCC presented the Fourth Assessment Report 'Climate Change 2007' (AR4). This report was reviewed by 6,000 scientists worldwide, making it one of the most critical documents with high scientific recognition. In AR 4, the IPCC concluded:

> "Warming of the climate system is unequivocal," and "Most of the observed increase in global average temperatures since the mid-twentieth century is very likely due to the observed increase in anthropogenic GHG concentrations."[3]

3. http://www.ipcc.ch/publications_and_data/ar4/wg1/en/spmsspm-direct-observations.

As a consequence of global warming, climate change appears in temperature anomalies and shifting seasons that are difficult to predict. The rhythm of the natural balance is disturbed by the increasing emission of greenhouse gases accumulating in the atmosphere. Daniel Murdiyarso, senior researcher at the Center for International Forestry Research (CIFOR) and Professor of Atmospheric Science in Bogor Agricultural Institute (IPB), stated, "Because the climate is also a physical feature of an area, if a change appears, it bro*Ad*ly affects the biotic (living) and abiotic (non-living) components. It is possible that for the change to become permanent due to the loss of essential components in the area, such as the forest as an ecosystem or the species in the forest ecosystem."[4] Therefore, the impact of climate change is fatal and terrible because once it occurs, it is irreversible.

Furthermore, climate change occurred after the Industrial Revolution of the 17th and 18th centuries due to the advances in science and technology that were oriented toward a capitalistic economy and massive exploitation of natural resources. Unfortunately, no significant efforts to reduce greenhouse gas concentration and accumulation in the atmosphere have been made.

The threat of climate change is terrifying. The World Bank (2012) illustrates that if the global community fails to act on climate change and goes about business as usual, the temperature will likely increase by 4 degrees. That would have disastrous consequences: flooding of coastal cities, increasing risks for food production, potentially leading to higher malnutrition rates, dry areas becoming dryer and wet areas becoming wetter.

Criticism of Environmental Philosophy on Religious Beliefs

Crucial to the protection of the earth are the needs of all creatures, including humans. Climate change causes an environmental crisis and massive instability due to temperature anomalies and shifting seasons. The recent frequent occurrence of storms and hurricanes in several places is regarded as a consequence of climate change. Moreover, the frequency of storms and larger sea waves, and, similarly, the longer of the dry season (el Niño) and wet monsoon season (la Niña), are increasing.

Flooding has become increasingly common. These floods are due to climate anomalies, damage to the balance of nature, and the reduced carrying capacity of the earth. The primary questions to be answered are: Is there further action that can be taken to subdue this environmental crisis? Why do ongoing environmental problems and damage occur? According to Lynn White Jr., the perception of humans depends on their faith in religious teaching:

> *"[The] mentality of the Industrial Revolution, that the earth was a resource for human consumption, was much older than the actuality of machinery, and has its roots in medieval Christianity and attitudes towards nature... what people do about their ecology depends on what they think about themselves in relation to things in their environment."*[5]

4. Daniel Murdiyarso, "Perubahan Iklim: Dari Obrolan Warung Kopi ke Meja Perundingan", *Prisma*, April 2012, page 23-33.
5. Lynn White, Jr, *The Historical Root of Our Ecologic Science*, Vol. 155 (Number 3767), 10 March 1967, page. 1203 – 1207.

Lynn White declared that the root of the environmental crisis is the Industrial Revolution mentality. However the idea that the earth is a resource for human life is far older than the machine. That also has its roots in Medieval Christianity, and it was that which determined the attitude of the industrialists towards nature. Also, people's views on ecology depend on what they think about themselves and their environment.

Similarly, Seyyed Hossein Nasr (the world's leading scientist in Islamic studies and spirituality) has more extreme views about human relations and their responsibility for nature:

> *"Nature has become desacralized for modern man. Nature has come to be regarded as something to be used and enjoyed to the fullest extent possible... for modern man nature has become like a prostitute–to be benefited from without any sense obligation and responsibility toward her."*[6]

Consequently, nature is no longer 'sacred' for modern humans because nature's gifts are considered something that must be used and savored as much as possible. Nature for modern humans is not the verses created by Allah. Nature is treated like a prostitute for humankind's benefit. They feel they have no duty to be responsible for and care for nature, or even or think about the welfare of future generations. When permits are granted, investors and businesspeople are only accountable and pay off their obligations, paying contributions for forest products or licenses required by the government without other burdens. Later, they quickly take advantage of nature and leave behind potholes, landslides, loss of resources, and other damage.

Moreover, many businesspeople lose touch with Allah in their work. The profits obtained are intended for short-term human welfare. Therefore, exploitation is justified. Thus, the disintegration of religious messages and human will (greediness) emerged, as described by Seyyed Hossein Nasr:

> *"The harmony between man and nature has been destroyed... but not everyone realized that this disequilibrium is due to the destruction of the harmony between man and Allah."*

Based on the previous explanation, humans may have strayed far and damaged the earth because they ignored religious messages and moved away from their religious beliefs.

6. S H. Nasr. "The Problem," taken from *Man and Nature* (first published 1967) (Chicago:Kazi Publication, 1997).

Integration of Environmental Conservation in Islamic Teachings[7]

The Quran is a life guide for humankind and the foundation of all our activities. On one level, this is about preserving body and soul and our relationship with the natural order. But, on another level, this speaks of communities of creatures that fly, creep, jump, and swim. And, on yet another level, it speaks of the universe, forests, and rivers. The core teachings of the Qur'an in this regard are described as '*Ilm al Khalq* (Knowledge of Creation), which existed long before the science of ecology developed in the modern era or in the 18th century.[8]

The teachings related to the environment are demonstrated through the following four main principles: (i) *Tawhid*, (ii) *Khilafa,* (iii) *Mizan*, and (iv) *Fitrah*. These principles are themes throughout the Qur'an that can be traced to raise awareness and to educate people on the management of natural resources and the environment. As we examine these principles, we will discuss them in the context of the Quran's universal message about the environment, using Islamic scientists' and scholars' views as references.

Tawhid

Tawhid, which is one of the essential elements in the principles of Islamic teachings regarding the environment, emphasizes that faith in Allah is absolute, ensuring Islam is a monotheistic religion. By acknowledging *Tawhid*, we acknowledge that Allah is One and that His creation also has the characteristics of unity. Allah as the creator has created so that His creation will be treated as an instrument to worship Him (Qur'an 5:56). Allah SWT is *al-Khaliq* (creator) who created the heavens, the earth, and everything in them.

> "He is Allah, the Planner, Executer and Fashioner of creation. His are the names most beautiful. Whatever is in the heavens and the earth extols His Glory. He is the Most Mighty, the Most Wise." (Surah Al Hasyr, 59:24).

Acknowledging *Tawhid*, Muslims are also aware of the harmony of the creator who owns the cosmic laws that have governed the rotation of the earth, sun, moon, stars, and other celestial bodies for billions of years without any incidents. For billions of years, the earth has never collided with the moon or the moon with the sun. Without Allah's orders, none of this would have happened because He is the one who determines the orbits for each of these celestial bodies:

> "It is He Who gave the sun radiance and the moon light, and determined the stages (for the waxing and waning of the moon) that you may learn the calculation of years and the reckoning of time. Allah has created all this with a rightful purpose (rather than out of play). He expounds His signs for the people who know." (Surah Yunus, 10:5)

7. This sub-chapter is a replication of part of the writing of Fachruddin M. Mangunjaya, "Islam and Natural Resources Management," in J.M. McKay (Ed). *Integration Religion Within Conservation: Islamic Belief and Sumatran Forest Management*. Darwin Initiative Case Study. Durrel Institute of Conservation and Ecology (UK: University of Kent, 2013), page 11-20.
8. Fazlun Khalid. "Qur'an Creation and Conservation." *Islamic Foundation for Ecology and Environmental Sciences* (UK: Birmingham, 1999).

> "Neither does it lie in the sun's power to overtake the moon nor can the night outstrip the day. All glide along, each in its own orbit." (Surah Yaasin, 36: 40)

> "Those who remember Allah while standing, sitting or (reclining) on their backs, and reflect in the creation of the heavens and the earth, (saying): 'Our Lord! You have not created this in vain. Glory to You! Save us, then, from the chastisement of the Fire." (Surah Ali Imron, 3: 191).

Osman Bakar[9] stated that being conscious of the Oneness of Allah SWT means upholding the truth that Allah SWT is One in His Essence, in His name, as well as in His attributes and actions. Bakar affirms the definition of *Tawhid* as the origin and demonstration of the soul of knowledge in Islam:

> "An essential consequence of asserting the fundamental truth is that society must embrace the objective reality of the unity of the universe. As a source of knowledge, religion asserts that everything in the universe is interconnected through the cosmic laws that govern it in a unified universal network. The cosmos consists of various layers of reality, not only physically, but also in the unified metaphysical origin which is called Allah in religion."

The Quran also emphasizes that cosmic unity is an excellent example of the nature of Allah Almighty:

> "They glorify Him night and day, without flagging." (Al- Anbiyaa, 21:20)

There is no difference between the living and the dead in the Islamic perspective because all are part of creation and continue to glorify Him.

> "The seven heavens, the earth, and all that is within them give glory to Him. There is nothing but gives glory to Him with His praise, though you do not understand their hymns of praise. He is Most Forbearing, Exceedingly Forgiving." (Surah Al-Israa, 17:44)

In another chapter of the Qur'an, it is stated:

> "Do you not see that all that is in the heavens and the earth, even the birds that go about spreading their wings in flight, extol His glory? Each knows the way of its prayer and of its extolling Allah's glory. Allah is well aware of whatever they do." (Surah An Nur, 24:41)

> "We guided Solomon to the right verdict, and We had granted each of them judgement and knowledge. We made the mountains and the birds celebrate the praise of Allah with David. It was We Who did all this." (Surah Al Anbiyaa, 21:79)

9. Osman Bakar, *Tauhid dan Sains: Perspektif Islam tentang agama dan Sains* (Bandung: Pustaka Hidayah, 2008).

All that is in the heavens and all that is in the earth extols Allah's glory (Surah Ath Taghabun, 64:1), There is nothing but gives glory to Him with His praise, though you do not understand their hymns of praise. (Surah Al-Israa, 17:44).

This also reflects His oneness (*Tawhid*), whereby the creation of nature and humans have the same goal. Therefore, the essence of *Tawhid* is that everything in the heavens and the earth comes from the One creator (al-wihdah).

> "Had there been any gods in the heavens and the earth apart from Allah, the order of both the heavens and the earth would have gone to ruins. Glory be to Allah, the Lord of the Throne, Who is far above their false descriptions of Him." (Surah Al Anbiyaa, 21:22)

There are two aspects of *Tawhid* preserving the goodness of the earth and the universe. First, the essence of the Oneness of Allah SWT; that He has no partners, that He stands alone, that He was not created by anyone but is the Creator (*al-khaliq*). Humans are thereby prohibited from opposing Him by competing with aspects of His creation. Second, Allah SWT has created a unity that cannot be separated. Allah SWT provides perfection for all His creations in a well-organized and orderly system. Everything is interrelated, but there is no way for humans to have a complete understanding. For example, the integrity of an ecosystem is based on a sequence of things that cannot exist independently. An ecosystem is a mixture of various species, fauna, flora, microorganisms and minerals - things considered dead but which supply energy for life.

All things in an ecosystem, the creatures and the creations, worship Allah SWT, as in His word:

> "The seven heavens, the earth, and all that is within them give glory to Him. There is nothing but gives glory to Him with His praise, though you do not understand their hymns of praise. He is Most Forbearing, Exceedingly Forgiving." (Al Israa, 17:44)

Therefore, Allah's creations are subject to Him in their distinct manner. Ibn Kathir (1301-1373) accentuated the verse "nothing but gives glory to Him." It means there is no creature that does not glorify and praise Allah. "Though you do not understand their hymns of praise!" It means humans do not understand other creatures' songs because they speak in their own languages. As in Sunan an-Nasa'i (the book of Hadith Alhlu*Sunnah* wal Jamaah collected by Imam Nasa'i quoted by Ibn Kathir[10] from Abdullah bin Amr), the Prophet Muhammad forbade the killing of frogs by saying, "Its sound is a *tasbih*." Therefore, the sound made by Allah's creatures is a testimony of His oneness, in the rububiyah (order) and the *Ilahiyah* (divinity) of Allah SWT, said by Ibn Kathir as:

> "In everything is a sign, which shows that He (Allah) is one."

10. Ibnu Katsir, *Tafsir Ibnu Katsir* (Jakarta: *Pustaka Imam Asy Syafi*i, 2007).

Therefore, as part of the unity of the universe, humans and other elements of the natural ecosystem must submit to and obey Allah's laws, commonly known as natural laws. A logical consequence is that humans must respect nature. We should not see nature as an object to be exploited and destroyed without truly understanding the meaning, essence, and function of ecosystems. Instead, we must seek various ways to preserve it.

Likewise, if human origins are destroyed, chaos will occur, just as the loss of one element of a perfectly balanced system will render it a disorganized and chaotic system (see *Mizan*).

Khilafa / Succession of the Stewards

The Muslim scholar Nurcholish Madjid[11] stated that when Allah announced the creation of humans, this appeared as a cosmic drama, a transaction of human creation as described by the Quran in which Allah SWT placed humans as *khulafa'* (successors or stewards) on earth.

> "Just think when your Lord said to the angels: "Lo! I am about to place a vicegerent on earth," they said: "Will You place on it one who will spread mischief and shed blood while we celebrate Your glory and extol Your holiness?" He said: "Surely I know what you do not know." (Surah Al Baqarah, 2:30)

Madjid explained that the "cosmic drama" involving Allah SWT, Angels, Humans, and Satan, at the primordial locus called Jannah (heaven, or Garden of Eden), started with Allah "saying" He will make humankind His *khalifa* on earth. The angels are doubtful and skeptical of humans' ability to carry out their duties, given their tendency to destroy and to shed blood. However, this protestation is denied by Allah. The Angels do not know His secret, which will be to teach Adam "all names" (*Wa allamâ 'Adamâ al-Asmâ a 'kullaha*).

Madjid[12] stated that humans should carry out duties of succession as follows:

1. Human dignity is related to the concept that nature provides human needs such as arable land and a place to carry out their duties.
2. This dignity is also bonded to universal human values.
3. In carrying out their duties as *khalifa* of Allah SWT on earth, humans are equipped with knowledge.
4. Human dignity comes with freedom, with certain restrictions (all but the forbidden tree's fruit can be eaten).
5. Every violation of these restrictions degrades humankind.
6. The urge to violate these boundaries is called greed, which is an unquenchable feeling that all the gifts from Allah SWT are not sufficient.
7. Because science alone does not guarantee that humans will not be degraded, the direction of Allah SWT is needed as a spiritual safety net.

11. Nurcholish Madjid, *Cita-cita Politik Islam Era Reformasi* (Jakarta: Yayasan Wakaf Paramadina, 1999)
12. *Ibid*.

In shaping a dignified life, spirituality is the vital element needed control negative human attitudes. Humanity is eternal for people who carry out the task as *khalifa* / steward, complete with all its dimensions.[13] In conclusion, the status of the *khalifa* is given to humans so that they act responsibly in caring for the earth.

In caring for the earth, humans are expected to act based on knowledge and not just on desires (Surah An Nisaa, 4: 135; 23:71). That is because greed yields environmental disasters, even extinction. Therefore, the daily depletion of natural resources is a challenge for humans and it is a means of making them aware that exploitation should not violate the balance. In addition, humans are expected to fulfill their promise of carrying out their assignments, as Allah SWT states:

> "We offered the trust to the heavens and the earth and the mountains, but they refused to carry it and were afraid of doing so; but man carried it. Surely he is wrong-doing, ignorant." (Surah Al Ahzab, 33: 72).

Mizan

Allah SWT delivered a clear illustration in the Quran regarding the balanced creation of the heavens and the earth, as He said in Surah Ar-Rahman:

> The Merciful
> One has taught the Qur'an has created man
> and has taught him articulate speech
> The sun and the moon follow a reckoning
> and the stars and the trees all prostrate themselves, and He has raised up the heaven and has set a balance
> that you may not transgress in the balance, (Surah Ar-Rahman, 55:1-8)

Allah creates a sense of balance through the constant gravitational force acting on the celestial bodies so that they remain in their respective orbits. The balance helps the earth and the other planets in the solar system revolve around the sun consistently. Because of the balance and gravity that Allah SWT has created, the earth rotates on its own axis without disturbance.

What would happen if the force of gravity was more potent than what we experience today? We would, of course, find it difficult to walk, let alone run. Humans and all creatures would consume more energy to walk. What would happen if gravity disappeared? Dust and all particles, including garbage, twigs, and everything else, would float in the air, and we would find it very difficult to breathe on the Earth's surface. The speed of the rain would decrease drastically, and the water might even evaporate before hitting the Earth's surface. Rivers would flow very slowly, and it would not be easy to generate electricity from rivers as we do today.[14] With climate change, resulting from the accumulation of emissions from fossil fuels in the atmosphere, humans have overstepped and damaged the earth's fine equilibrium/balance (*Mizan*). Moreover, humans have polluted the air, cut down trees and burned forests, so that emissions and carbon dioxide in the atmosphere have grown thicker, which has resulted in global warming. The subsequent effect is climate change; melting ice floes at the Earth's poles and mountain peaks.[15]

13. *Ibid*.
14. Harun Yahya, *Design in Nature* (London: *Taha Publisher*, 2002).
15. Fazlun Khalid, *Sign on The Earth: Islam Modernity and Climate Crisis* (Leichester: Kube Publishing, 2019), page. 164.

In this context, Allah SWT set His creation at a precise standard. He said the following:

> "Lo! We have created everything by measure." (Surah Al Qamar, 54:49).

Accuracy ensures balance in life on earth; such is the teaching of Islam. Even the human mind and conscience are created in harmony with its teachings (see *Fitrah*). Therefore, humans should not lean too strongly to the right or left, but try to achieve balance in all aspects of life.

The idea of balance is always prioritized in conservation efforts.[16] Disruptive phenomena, such as landslides, floods, hurricanes, and climate change, are thought to be a direct result of imbalances. For example, when trees in forest areas and land with extreme slopes are cut down and the land is converted to farming, it becomes unstable and causes landslides. Floods occur because forested land, which acts as a sponge to retain water during the rainy season, is damaged and can no longer store water in the soil. Climate change occurs because the atmosphere is becoming thicker with greenhouse gases caused by uncontrolled human activities, including carbon dioxide (CO2) produced from fossil-fueled vehicles and industry.

Al Gore[17] remarked that humans unleash 90 million tons of CO2 every day. Forests (and oceans) absorb emissions and take 30 to 1,000 years to balance the release of CO2. Therefore, global warming occurs due to human activities that damage the balance through air pollution and greenhouse gases. Disturbances to this balance are called anthropogenic disturbances, or disturbances caused by humans.

Fitrah

Muslims believe that all humans are born pure. A baby is born pure and innocent as nothing interferes with its birth. If a baby dies, it dies in its purity. Therefore, a human may become pious or not depending on the parents' education.

In this case, *Fitrah* is knowledge that since Allah SWT created humankind, He has recognized them. In The Quran, the word *Fitrah* is found in Surah Al Rum (QS 30:30):

> " (O Prophet and his followers), turn your face single-mindedly to the true Faith and adhere to the true nature on which Allah has created human beings. The mould fashioned by Allah cannot be altered. That is the True, Straight Faith, although most people do not know."

16. Al Gore, *Earth in the Balance: Ecology and the Human Spirit* (Boston: Houghton Mifflin, 1992).
17. Al Gore, *Our Choice: Rencana untuk Memecahkan Krisis Iklim* (Jakarta: Kanisius, 2010).

Ibn Kathir stated that humans should follow their nature as designed by Allah. Allah SWT bestows *Fitrah* that He is One, that there is no other true god (ilah) besides Him, according to Surah Al-A'raaf (7:172). Furthermore, He says "there must be no change from the *Fitrah* of Allah SWT." In other words, humans must neither change Allah's creation nor change the human nature that Allah SWT has given. Allah SWT creates all His creation equal by bestowing *Fitrah* on every human being, and there is no difference between them. Mohammed Yasien defines *Fitrah* as follows:

> ""The concept of *Fitrah* as genuine goodness, in my view, connotes not only a passive acceptance to act good and right but an active and innate inclination to know Allah, to submit to Him and accomplish what is right. Such characterization defines a natural human tendency in the absence of opposing factors. Although all children are born in *Fitrah*, environmental influences are powerful. Parents have the power to decide a child's religion by making him a Christian, Jew, or Magian. If the negative influences are absent, the child may continue to manifest his true nature. Since many babies are born with physical disabilities, the injury referred to in this hadith is not meant physically. All children are born spiritually pure, in a state of *Fitrah*. The reference to an animal being born whole in the core hadith should be seen as an analogy to describe a similar state of spiritual wholeness when a child is born." [18]

Thus, *Fitrah* in Islamic teachings on the environment means that Allah SWT orders humans to stand fast to their promises following Islamic *Fitrah* (their nature). Islamic teachings provide moral boundaries: humans should not be wasteful, let alone create destruction (QS 3:147; 5:77; 6:141; 7:31).

Sustainable Development

The publication entitled Islamic World and Sustainable Development (ISESCO 2002) contains general principles of sustainable development. The general principles discuss various issues and efforts that should be taken to advance certain nations, especially with Muslim populations. The following Quranic principles are used as a guideline:

The Unity of the Universe

Since the development of human knowledge, the unity of the universe as a system has been increasingly recognized. In their respective positions, the stars in the sky enrich human knowledge of wind direction and seasons. The characteristics of nature are studied and formulated in human knowledge. Humans recognize names, types, grades or sizes, capacities, weights, and possibly anomalies (deviations from natural events) that have long become a formula. The universe has been studied since the time of the Greeks, through cosmology. Cosmology is a field that studies the structure and history of nature on a large (cosmic) scale. This science is related to human knowledge of the evolution of all of Allah's creations. Accordingly, cosmology is studied in astronomy, philosophy, and religion.

18. Mohammed Yasien, *Fitrah*: *The Islamic concept of human nature* (London: Ta-ha, 1996).

This interrelated natural structure is a perfectly harmonious system, showing that Allah, the One and Only, created nature. The various components of this system are harmonious and complementary creations. It is sometimes difficult to ascertain their function because it may not be comprehensible to humans. Understanding the existence of all creatures on earth requires tens or even hundreds of years of research to develop and produce scientific studies and documents. For example, the richness of living things and natural ecosystems, which differ in character according to bioregional areas, climate, productivity, and temperature, spur the evolution and variation of living things.[19]

Nature and its functions are mainly studied empirically, exploring facts and translating them into economically meaningful figures. For example, by conducting an assessment of ecosystem value by looking at the value of ecosystem services through Ecosystem Service Valuation (ESV).[20]

Ecosystem services directly support more than one billion people living in poverty. The services protect ecosystems and support economic development and poverty alleviation. Therefore, efforts to respect or protect terrestrial and marine ecosystems will jointly provide environmental protection solutions and alleviate poverty.[21]

The ecosystem is an ecological system formed by the inseparable interrelationships between living things and their environment. In another definition, the ecosystem is a unified whole and a complete order among all elements of the environment that influence each other. Every living thing has a role. For example, trees produce oxygen and absorb carbon dioxide, while the surrounding organisms breathe oxygen and emit carbon dioxide. Nutrients are produced by organic and inorganic substances, including water absorbed by tree roots that process food in green leaf substance (chlorophyll) with the help of sunlight, carry the resulting products through channels in trees and store them in tubers, stems and fruit. Living things benefit from fruit, stem and tuber yields in plant populations that constantly multiply.

Living species in the environment, such as birds, bats, and monkeys, have different tasks which include pollination and seed dispersal. The population becomes widespread, and interactions construct a balanced, compound, dynamic, harmonious, and mutually supportive nature. This unity of nature reflects the great gift of Allah to humankind.

19. Marin J *et al*. "Evolutionary time drives global tetrapod diversity". Proc. R. Soc. B 285: 20172378. http://dx.doi.org/10.1098/rspb.2017.2378, 2018.
20. Turner, W. R., Brandon, K., Brooks, T. M., Costanza, R., Da Fonseca, G. A., & Portela, R. "Global Conservation of Biodiversity and Ecosystem Services". *BioScience*, 57(10), 2007, page. 868-873.
21. *Ibid*.

Balance

Like a ship laden with passengers, this earth sails in the middle of the ocean of the universe and revolves around one star, the sun, in the center of the Milky Way galaxy, which has only 100 hundred billion stars.[22] The creation of the heavens and the earth is greater than the creation of mankind (QS 40:57). All living things, large and small, and micro-organisms — including humans — live together in all corners of the earth comfortably because the earth is balanced.

Earth is comfortable and habitable because its temperature and air support life. Endurable and adequate temperatures cause the processes of life and evolution to occur so that species become diverse. As a result, most creatures are well adapted to live in this environment. Species live in a stable and balanced ecosystem where they can adapt. However, the number of species of flora or fauna will vary slightly in extreme areas, such as in polar ice caps, deserts, mountain peaks, and the deep sea.

The stability of the earth's global temperature has been maintained for millions of years to balance the earth. This is because the earth's atmosphere counteracts and absorbs sunlight and ultraviolet radiation so that it does not go directly to the earth, warms the earth's surface through reflected heat which is called the greenhouse effect, and reduces the extreme temperatures of day and night.

The earth's atmosphere is formed of a layer of gas. The atmosphere protects life on earth by creating pressure, which allows liquid water to exist on the earth's surface under ideal conditions. The atmosphere affects the climate, temperature, humidity, pressure, wind, precipitation, ultraviolet light, and other climatic variables that occur over a long time. Hence, the thickness of the atmosphere and its gas concentration are used as a reference for reaching the climate stability goal. A stable and balanced climate benefits life on Earth. The Quran mentions it as *mizan* (balance). Allah SWT created this balance:

> "The Merciful One has taught the Qur'an, has created man, and has taught him articulate speech The sun and the moon follow a reckoning, and the stars and the trees all prostrate themselves, and He has raised up the heaven and has set a balance that you may not transgress in the balance." (Surah Ar-Rahman, 55: 1-8).

Mizan is a critical keyword in capturing Allah's creation because everything is created in a balanced state.[23] Humans are destroying that balance and rendering creation unbalanced. Therefore, Muslims must understand and respect the *Mizan* in viewing the natural world.[24] These *Mizan* principles must be maintained and must become the subject of an agreement by making the atmosphere ideal to preserve the life on earth.[25]

22. The Milky Way has fewer stars and is considered a small galaxy. Several other galaxies have hundreds of billions of stars. Human knowledge records that there may be more than 170 billion (1.7 × 1011) galaxies in the observable universe.
23. Fazlun Khalid, *op.cit*.,
24. *Ibid*.
25. Rounsevell et al. suggest a single indicator of global average temperature change and a target (2 degrees C maximum rise from pre-industrial levels) as a meeting point for policy action and agreement on biodiversity. The target is to keep species from extinction. See: Mark D. A. Rounsevell, Mark DA, Harfoot,M., Harrison, PA., Newbold,T., Gregory, RD., Mace, MA. Georgina. "A biodiversity target based onspecies extinctions". *Science*. Vol. 368, Issue 6496, 2020, pp. 1193-1195 DOI: 10.1126/science.aba6592

A Fixed Measure

Everything is created in a fixed measure, and there is a standard for everything. There exists a mass, grade, and a quantifiable scale. When a pure substance mixes with another substance, a reaction affects its respective levels. The principles are:

> "Allah knows what every female bears; and what the wombs fall short of (in gestation), and what they may add. With Him everything is in a fixed measure." (Ar-Raad (13): 8)

> "We sent down water from the sky in right measure and caused it to stay in the earth, and We have power to cause it to vanish (in the manner We please)." (Al Muminun (23):18)

> "He to Whom belongs the kingdom of the heavens and the earth; Who has taken to Himself no son nor has He taken any partner in His kingdom; Who created everything and then determined its destiny." (Al Furqan (25):2)

Ibn Kathir interprets the sentence "Who created everything and then determined its destiny" as referring to the Creator of all things, Rabb, King and Allah. Everything is under His control, his rules, his order and his destiny.[26] Physicists and philosophers of cosmology have formulated the laws of nature in mathematical terms, finding perfect measures to prove the unity of the universe. Likewise, medieval Muslim scientists used mathematical formulae for discovering the power of Allah. The Ikhwan al Shafa wrote:

> "Undoubtedly, the forms of numbers in the human soul correspond to the forms of existence in the matter (the hyle). Therefore, numbers are an example of a higher world. Through knowledge of it, students of wisdom gradually become acquainted with other mathematical sciences, natural sciences, and metaphysics. The science of numbers is the root of the sciences, the basis of wisdom, the beginning of the divine sciences."[27]

Diversity

Diversity on earth is essential to life. Diversity is reflected in function, role, uniqueness, and harmony. There are practical ecological functions for diversity of life, ranging from predators and prey, to flora, which are sources of food and producers of carbohydrates and oxygen. Furthermore, other living things act as decomposers after death, such as worms and decomposer insects that process and refine organic matter into nutrients needed to fertilize the soil, which is in turn needed by plants.

> "He it is Who spread the earth for you; and made in it paths for you, and sent down water from the sky, and then through it We brought forth many species of diverse plants." (Thaha (20):53)

26. Ibn Kathir›s Commentary on Surah Al-Furqan, 25: 2
27. Husain Heriyanto, *Menggali Nalar Saintifik Peradaban Islam* (Bandung: *Mizan*, Cet.-1, 2011), page 219.

The diversity of life is a gift that must be maintained because it contains significance and functions that humans may not widely understand. For example, various plants in tropical forests have medicinal properties. Many pharmaceutical companies extract these herbs for medicines.

About 120 prescription drugs sold worldwide come from rainforest plants. In addition, the United States National Cancer Institute discovered that more than two-thirds of all medicines found to have cancer-fighting effects come from rainforest plants.[28]

Some of the compounds in tropical rainforest plants—such as those in the Amazon jungle or the forests of Kalimantan and Sumatra, Indonesia—are used to treat malaria, heart disease, bronchitis, hypertension, rheumatism, diabetes, muscle tension, arthritis, glaucoma, dysentery, tuberculosis, and other health problems. In addition, many commercially available anesthetics, enzymes, hormones, laxatives, cough drops, antibiotics and antiseptics are also derived from rainforest plants and herbs.[29]

The diversity of plants turns out to have different functions. Likewise, the properties resulting from each bio-active substance of plants and animals also have their respective functions.[30]

Succession

The long history of humans on earth provides an example for modern humans' treatment of natural resources. The civilization of humanity occurs in a cycle. No matter how far technology develops, it will not make individuals live eternally on this planet. Earth is a legacy that will be passed on (reserved) for future generations. The current generation has the mandate to take care of it. Humans take care of the earth as a loan from future generations who will inherit it with their intellect and intelligence. All generations take turns using the Earth's resources ethically, whether destroying or caring for them, according to the words of Allah SWT:

> "Now We have appointed you as their successors in the earth to see how you act." (QS: Yunus (10): 14)

That means humans should seek to establish sustainable life. It is therefore is necessary to create diverse strategies to achieve this sustainability. As is scientifically recognized, the climate on this planet is truly in a state of crisis and is under threat. The Intergovernmental Panel on Climate Change (IPCC), a scientific panel consisting of scientists from around the world, warned in 2007:

28. "Tropical Rainforests Are Nature's Medicine Cabinet". https://www.thoughtco.com/ tropical-rainforests-natures-medicine-cabinet-1204030, accessed on June 15th, 2020.
29. *Ibid*.
30. Bioactive Compounds are compounds or substances that have efficacy, function, or positive effects on body health.

> "By 2050, it is likely that global mitigation efforts designed to cap effective greenhouse gas concentrations at, for example, 550 ppm would benefit developing countries significantly through the middle of this century, regardless of whether the climate sensitivity turns out to be high or low, and especially when combined with enhanced adaptation. Developed countries would also likely see significant benefits from an adaptation- mitigation intervention portfolio, especially for high climate sensitivities and in sectors and regions that are already showing signs of being vulnerable. By 2100, climate change will likely produce significant vulnerabilities across the globe even if aggressive mitigation were implemented in combination with significantly enhanced adaptive capacity.[31]

In 2019, the United Nations recorded the second warmest year in a decade (2010-2019). This escalation is due to carbon dioxide and pollutant emissions thickening the atmosphere, up to 414.7 ppm in May 2019.[32] Since the first 'Earth Day' was declared in 1970, carbon dioxide levels have increased by 26 percent, and the world's average temperature has increased by 0.86 degrees Celsius.

Today, the temperature of planet Earth is 1.1˚C warmer than in the pre-industrial era, and this trend will likely continue. However, this warming has been uneven: Europe experienced the most significant change in the last decade (around +0.5˚C), and South America experienced the slightest change.

Other key indicators illustrate the acceleration of climate change over the last five years. These include the thermal expansion of seawater. Sea levels have risen by 112 millimeters since 1970, largely due to glacial melting in the Arctic and Antarctic.

Climate change affects every country on all continents. It hinders national economic growth and affects life. In addition, weather patterns are changing and becoming more extreme. For example, America experienced the most significant fires in its history, and the forest fires that devastated the Australian continent reached 11 million ha in September 2019. Those fires were still ongoing until January 2020.[33]

Although greenhouse gas emissions are projected to fall by around 6 percent in 2020, due to travel bans and the slowing economic growth caused by the Covid-19 pandemic, this decrease will only be temporary. According to UN observations, climate change will not stop. It is predicted that if the global economy begins to recover from the pandemic, emissions may reach higher levels.[34]

It is evident that there have been immense changes to the natural world. Despite this, humans remain reluctant to alter their lifestyles; i.e., to use natural resources more carefully and to live more sustainable lives. This means that human civilization will not survive.

31. Yohe, G.W., R.D. Lasco, Q.K. Ahmad, N.W. Arnell, S.J. Cohen, C. Hope, A.C. Janetos and
R.T. Perez, 2007: Perspectives on Climate Change and Sustainability. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 811-841. https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg2- chapter20- 1.pdf
32. "Atmospheric CO2 hits record high in May 2019". https://earthsky.org/earth/atmospher- ic- co2-record-high-may-2019 retrieved June 20, 2020.
33. "Australia fires: A visual guide to the bushfire crisis" on https://www.bbc.com/ news/world-australia-50951043.
34. https://www.un.org/sustainabledevelopment/climate-change/.

Obedience

Allah created the jin and humankind only that they might worship Him. (QS 51:56). Undoubtedly, it is easy to live on Allah's earth because all human beings were intended to do good and to conduct goodness (*ihsan*) (QS 67:2). So, humans must live obediently, keep their duty, and be submissive to Allah SWT. (Al Baqarah (2):2, 21, 41). Performing good deeds to protect the environment from damage is an act of obedience and piety.

> "We created not the heaven and the earth and all that is between them in play." Al Anbia (21):16

Allah SWT created the heavens and the earth with truth, quality and goodness. The Quran provides guidelines on the creation's characteristics such as size, content, and character. Although The Quran is not a science or ecology textbook, its message provides clear instructions on the characteristics of Allah's creation in a universal message for humans to think about and research.

The Quran speaks of universal unity, or what we now call an ecosystem. An ecosystem is a unity of interacting biotic and abiotic creatures, consisting of various populations that create a symbiosis, working together in mutualism and commensalism. Obedience to the Creator is an essential determinant; obedience to Allah and to the prophet Muhammad guarantees victory.

> "Those who obey Allah and His Messenger and fear Him and avoid disobeying Him: such, indeed, shall triumph." (Surah An- Nur, 24: 52)

Furthermore, the following points should be kept in mind:

- Islam teaches integration; there is no dichotomy between knowledge (science) and religious belief.
- Allah SWT delivers gifts and sent the Quran and *Sunnah* as guidelines in caring for the earth.
- Preserving nature and the environment is part of the mission of the *khalifa* (the successor or steward).
- Maintaining and preserving the perfect equilibrium (*mizan*) of the earth is a form of trust so that humans remain in their *Fitrah*.
- The Qur'an is a clear manifestation of the qualities of Allah's creation which has size, content, and character.

Chapter 2
Ethics, Morals, and Lifestyle

"Life in this world is sweet and green, and indeed, Allah has made you successors there to see how you will behave." (Hadith by Muslim)

Introduction

Islam, the environment, and climate change are closely intertwined. Allah SWT bestows sense and knowledge to humans to be *khalifa* on earth, in order to understand and preserve the earth and everything in it. Humans and their religion are closely connected because religious orders rule human life on earth. Thus, it is based on religion that humans have an interest in taking good care of nature and the surrounding environment. Good environmental conditions and suitable climate will affect the goodness and continuity of life and meet the needs of human existence.

The religious advice that stresses the importance of caring for the earth and its contents is the same as the goal of environmental activists: to behave healthily, not to be wasteful, not to destroy nature, and to avoid excess. In other words, the world's religions have long been campaigners for the importance of preserving the environment, as stated in holy books (religious texts) and in the traditions and practices of their adherents who carry out and diligently protect the natural environment.[1]

Fazlun Khalid said that Islam is a religion of the environment, Islam is inherently environmental, Islam is interwoven with a pleasing environment.[2] For example, Islamic teaching requires a clean place to pray; though it is on the ground, the land must be undoubtedly pure from *najis* and other polluting objects. Islam forbids us to live extravagantly, behave wastefully and destroy things unnecessarily. Even in war, Muslims are forbidden from cutting down trees and killing livestock. In Islamic practice, Muslims must perform purification (*thaharah*) by using holy and purifying water. Purifying water must be obtained from a place protected from contamination. Sources of water that are holy and purifying (*mutlaq water*) are from nature, be it the sea, rivers, or groundwater.

1. This tagline, taken from the ARC (Alliance of Religions and Conservation) website: Who were the first environmental campaigners? Answer: The world's religions. Why?
2. In our discussion, Fazlun stated that "Islam inherently environmental" several times.

Environmentalists should learn many ways of preserving the environment from religious leaders. Religions convey practical aspects of environmental care in the form of simple daily ethics: religion conveys a prohibition to do something, and those who violate the prohibition are sinful. Equally, religion advises good deeds, and those perform them will receive a reward. Hence, it is easy for religious adherents to choose their behavior without the economic incentives generally proposed by environmental economists.

In the history of creation, humans were sent to help life on earth prosper, not to destroy it. In principle, of course, religion may be understood to be the oldest environmental institution that has systematically reminded humans not to waste, not to behave indecently, and not destroy Allah's gift on earth.

As a nation that upholds religion, we must ensure that religious beliefs mitigate climate change. As stated by Al Gore, the environmental crisis related to climate change is rooted in moral obligation.[3] Moreover, religion is the primary ethical carrier in human life. Therefore, religion is obliged to enlighten its adherents about climate change. In other words, observing the root of the problem, religion certainly has a vital role in intervening in the current crisis.

Ethics and Morals

The word 'ethics' is originally derived from the Greek word "ethikos," which means a habit. Therefore, ethics includes normative views on human actions or deeds. 'Ethics' is used as a common language, while Islamic culture uses the term "*adab,*" such as *adab* for praying, *adab* for dressing, *adab* for ablution, *adab* for visitation, and so on. There are many writings on *adab*. One is the writing of Abdul 'Aziz bin Fathi as Sayyid Nada (2008), who wrote the book: *Mausû'ah al Adâb al Islamiyyah al Murattabah 'alâ al Hurūf al Hijaniyyah,* which is translated as The Encyclopedia of Islamic Ethics. This book includes the rules of the daily association, which covers etiquette from Muslims waking up and socializing to the ethics of wills.[4]

In addition, morals are related to human actions as positive, non-destructive behavior. In the context of Islam, it is called *akhlak*.

Prophet Muhammad SAW said:

> "I have been sent to perfect the prominent virtues (of mankind)." (Hadith by Al-Baihaqi).

The moral guidelines of Muslims are the *Sunnah* and the morals of the Prophet Muhammad. The Prophet behaved as instructed in the Qur'an. Therefore, the Prophet had a great personality and morals (Surah Al Qalam, 68:4).

3. This is a moral challenge in our time. Dalam video pendek: Stop The Clock on Extinction (http://www.youtube.com/watch?v=QpiSXsHdNr4) retrieved June 19, 2009.
4. Abdul ‹Aziz bin Fathi as Sayyid Nada (2008), who wrote the book: *Mausû'ah al Adâb al Islamiyyah al Murattabah ‹alâ al Hurūf al Hijaniyyah," Ensiklopedia Etika Islam.* (Translated by: Muhammad Isnainidkk) (Jakarta: Maghfirah Pustaka, 2008), page.783-789.

For a Muslim, morality, which is also a way of life, is based on Prophet Muhammad's moral example and the values contained in the Qur'an. Therefore, reciting the verses of Allah SWT, Qauliyah and Kauniyah verses, is a method to identify these moral foundations.

The morals of caring for the environment are identified by understanding kauniyah verses on nature and the character of earth and its contents. This subject should be introduced through the analysis of Islamic Science. So, when there is damage to the verses of Allah, His *sunatullah* will take effect. When you want to improve your quality by being more economical, such as using water for ablution or other needs, such attitude shows the right etiquette and upholds moral goodness.

In the environment and climate change context, sinful humans already know their actions will cause harm but they continue to carry out the same policies and cause damage. One example of moral choice is in choosing transportation. If people choose a private vehicle despite there being adequate and comfortable public transportation available, then their choice is immoral.

It is immoral for humans who understand and are self-sufficient to be extravagant and wasteful. Gambling, stealing, and corruption are immoral! Moreover, destroying, burning, taking, cutting down forests illegally and hunting protected animals are all immoral.

Nature is a legacy for our children and grandchildren. Its control and management are essential so that natural resources can be sustained for the future. Islam instructs its adherents to fulfill their moral obligation by always sharing, through *zakat, infaq and sadaqah*. That is because eradicating poverty and ending hunger are religious commandments and morals. Therefore, preserving the environment through moral actions is as recommended by the Qur'an and the *Sunnah* of the Prophet Muhammad SAW.

In general, the identification of problems encountered by humans in ecological and climate change is as follows:

1. Exploitation and over-exploitation of natural resources. Overexploitation that results in the loss of natural habitats will ultimately create natural imbalances. For example, the increase in greenhouse gases causes the atmosphere to thicken, and CO2 can no longer be naturally absorbed because many forests have been cut down due to over-exploitation.
2. Emission of greenhouse gases (GHG) continues to increase due to the high frequency of consumption of fossil fuel for energy. Meanwhile, fuels such as oil and coal are made from non- renewable fossil materials, which continuously release carbon into the air, resulting in a thickening of the atmosphere and more heat. The earth reacts to this event, resulting in an increase in average temperature. In turn, the ice sheets at the north and south poles are melting and, worryingly, causing low-lying areas to sink slowly.
3. Human behavior in response to their power. Science and technology have given humans the power to do anything. So, sometimes they forget their *Fitrah* and that they need a healthy earth and ecosystem to survive.

Figure 1: Four factors that influence behavioral change.

These three factors can be improved gradually through a change in behavior towards the environment. Unfortunately, changing behavior from bad to good is not easy. However, various elements, such as religion/culture, law enforcement, market demand/economy and education contribute to behavioral change.

These four complementary factors drive behavioral change. The emerging elements to tackle climate change are closely related to perceptions, psychological experiences, obedience, and humans' good intentions, either individually or collectively.

Religion

Religion, in some instances, influences culture, as the two can be mutually decisive. Religion contributes to establishing culture through teachings that provide moral guidance and through the order of life that becomes the basis or guideline for a culture.

The majority of civilizations in the world are rooted in their culture and religion. However, Eastern culture is different from Western culture. Hence, culture and religious practices can vary in actuality. Beyers stated that (i) Studying religion cannot go without studying culture; (ii) Studying culture cannot go without studying religion; (iii) Studying inter-religious dialogue cannot go without studying underlying traditions and myths that contribute to how the Other is viewed.[5] In environmental awareness, by considering culture, religion becomes the determinant of behavior change so as to have a positive impact on environmental sustainability. Consequently, cultural and religious approaches are essential components of behavior change that upholds moral values.

5. Jaco Beyers, "Religion and culture: Revisiting a close relative Herv." teol. stud. vol.73 n.1 Pretoria 2017 http://dx.doi.org/10.4102/hts.v73i1.3864.

The contribution of religion to changing the behavior of its adherents by providing positive encouragement for environmental improvement is very effective. Indonesia has succeeded in encouraging people to support family planning programs through the Indonesian Ulema Council (MUI) muzakarahs and fatwas. Meanwhile, a fatwa approach has also been encouraged for the benefit of the environment.[6]

Religion, through its adherents, can encourage other environmental improvement activities. For example, religion can encourage the use of environmentally friendly paper for printing scriptures as a means of communication and dissemination of its teachings, in order to decrease deforestation. The Alliance of Religions and Conservation (ARC) records that 73 million copies of the Old Testament Bible and 123 million copies of the New Testament are printed every year. That is the world's best-selling book.

Furthermore, religious wisdom teaches humans to share with others by helping and donating. In 2005, a Christian organization dedicated to helping disaster victims, rehabilitation, and supporting fellow human beings regardless of religion, spent around 1.97 billion dollars worldwide.

As part of the efforts to change human habits in using fossil-based energy, various organizations and investors have since 2013 withdrawn their investment from activities related to non-renewable energy. These include educational institutions, faith-based organizations, healthcare institutions, governments, individuals, non-governmental organizations, pension institutions, endowments and foundations, private companies and family companies. Until 2019, these organizations withdrew US$12.1 trillion by no longer investing in dirty energy (oil, coal and natural gas).

Moreover, since 1974, over 300 Islamic Banks have not taken interest from their customers but have shared their profits. These banks manage their customers' finances, valued at $250 billion. In other words, the current rise of Islamic banking activities should also be carried out in line with environmental missions when human knowledge grows and their practical understanding of religion improves.

Law Enforcement

After regulation, the determining factor for the success of the change is law enforcement. Jimly Asshiddiqie stated: "Law enforcement is the process of enforcing or managing legal norms as guidelines for behavior in traffic or legal relations in social and state life". [7]

Strict law enforcement is necessary for behavioral change because it disciplines people and prevents them from violating rules. It must be accompanied by supervision to establish behavioral change as a habit. Enforcement also has a deterrent effect expected to change bad behavior into good – that is, to encourage people to obey the law.

6. See, Fachruddin Mangunjaya & Praharawati, G. "Fatwas on Boosting Environmental Conservation in Indonesia." Special Edition on Religion and Environmental Activism in Asia. *Religions* 2019, 10(10), 570; https://doi.org/10.3390/rel10100570 (registering DOI)
7. Jimly Asshiddiqie, 'Penegakan Hukum'–available at di http://wwwhjimly.com/makalah/ namafile/56/'Penegakan Hukum'. pdf, retrieved May 31 , 2020.

Illegal logging, animal smuggling or forest burning will be reduced if strict law enforcement is carried out.

The law is a rule or norm. Therefore, law enforcement is the process of implementing or managing legal norms to guide manners in legal relationships of social and state life.[8]

Law enforcement is an essential keyword for other legal processes, including law-making, law socialization and dissemination, law habituation, and law enforcement.[9] The government or state regulators create laws or regulations based on laws made by the legislature. The purpose of law-making is to regulate the life of the community and the state in a sustainable manner.

Generally, the law enforcement process involves all legal subjects in every legal matter. Accordingly, anyone who implements normative rules, or acts based on the norms of the applicable law, is carrying out or enforcing the rule of law.

Law enforcement affects behavioral change because it has a deterrent effect and teaches a lesson that leaves an imprint, so perpetrators will not repeat unlawful acts. Strict law enforcement reminds people to be aware of the legal sanctions received for deliberately violating existing laws and regulations. A famous example of law enforcement is when the traffic police detect traffic violations and check documents and vehicle equipment (raids). Examining a driving license requires law enforcement in the form of a driver's license raid. Running red lights and ignoring road markings carry a sentence of a fine, to uphold the traffic laws. Consistent and strict law enforcement can also reduce the number of people driving while intoxicated, leading to fewer accidents.[10]

Unfortunately, law enforcement often requires a significant funding source, which is a complex and complicated process related to administrative matters. In addition, law enforcement to protect the environment, such as measures to protect against logging, encounters many challenges and adverse conditions contrary to the sense of justice: Logging is often carried out in order to meet a community's basic daily needs, particularly for communities that subsist off of their land.

The dilemma of law enforcement in the utilization of natural resources often clashes with the sense of justice. Around 48.8 million people live on state forest lands, and about 10.2 million of them are categorized as poor, while the resources they need depend on the forest where they live.[11]

8. *Ibid*.
9. *Ibid*.
10. Dula, Chris S., William O. Dwyer, and Gilbert LeVerne. "Policing the drunk driver: Measuring law enforcement involvement in reducing alcohol-impaired driving." *Journal of Safety Research* 38, no. 3 (2007), page 267-272.
11. Hani Afnita Murti, "Perhutanan sosial bagi akses keadilan masyarakat dan pengurangan kemiskinan." *Jurnal Analis Kebijakan* 2, No. 2 (2018).

This dilemma often emerges in communities living around wildlife sanctuaries, nature reserves, national parks, or protected forests. However, these communities often exist long before the state designates the forest as a conservation or protected area. Therefore, persuasive approaches need to be taken, such as empowering alternative economies as well as state fiscal investment to foster people's skills and encourage them to manage sustainable natural resources. This approach must also be boosted by policies that take into account social systems. These might include the provision of facilities for the assistance and development of social forestry, synergizing village government programs, activities funded through the Village Fund and other activities.[12]

Market Demand

The market determines whether a business is feasible or not based on economic profitability. Timber theft, for example, may stop if there is no market demand. However, the market becomes the space that opens opportunities by offering profit.

When the demand for arowana fish is high, there is a tendency to steal the fish in its habitat and smuggle it on the black market. That causes the arowana fish population to decrease in its natural habitat. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), an international agreement on trade in endangered animal and plant species, sets a quota for the sale of arowana fish. This agreement has been executed properly at the international level by raising the status of the appendix from appendix II to appendix I and carrying out research to breed wild Siluk fish.[13] As a result, market demand decreased due to strict control. Moreover, efforts to breed the fish were successful. Tight control in trade licensing renders market demand a legal endeavor.

Education

Education is necessary for creating environmental awareness. It must have specific goals in order to understand the importance of the environment, nature conservation, and other beneficial aspects. Education not only provides information but also stimulates awareness of the importance of caring for the environment.

Studies discussing the influence of education on behavioral change provide different outcomes. One such study determined that education generates empathy[14] through simulation. According to this study, it is necessary to adopt training methods for adults and a learning-by-play method for children to increase empathy towards the environment.[15] Education may also be delivered directly to the community whose behavior is to be changed and to the people around it. That affects the attitudes and perceptions of the community.

12. Ibid,
13. Emily Voight, *The Dragon Behind the Glass: A True Story of Power, Obsession, and the World's Most Coveted Fish* (New York: Scriber, 2016).
14. Zaki, J., "Empathy: A Motivated Account." *Psychological Bulletin* 140(6), 2014, page 1608- 47.
15. To see environmental practices in training communities, see: Edy W Hendras & Sony Razali, *Belajar Sambil Bermain*. (Jakarta: Conservation International, 2004).

The trend of environmental changes, which is caused by the modern human lifestyle thanks to advanced technology, is not isolated to only one or two nations. Therefore, when a climate change conference involves almost all countries, intensive discussions are needed to find sustainable solutions to the climate crisis. De*Ad*lock (stagnation) often occurs mid-discussion. In this regard, Emil Salim stated that the voices heard ahead of the UNFCCC COP-15 in Copenhagen, Denmark, had not been entirely encouraging.[16]

On the other hand, religious leaders, academics, and environmental activists have made considerable efforts to re-evaluate their respective religious interpretations in order to preserve the earth. Given that 85 percent of the planet's population are religious adherents, re-examining religion and its wisdom in tackling climate change is necessary.[17] Emil Salim believes that in the development of thought, every religion can motivate humans, society, and the nation in improving the quality of life and the environment.[18]

Lifestyle

Every two years, since 1998, the World Wildlife Fund for Nature (WWF), a non-profit organization concerned with the conservation of natural resources, conducts a study on the human consumption of the planet in the form of an ecological footprint.[19] This study is compiled under the title "Living Planet Report" which displays the Living Planet Index (LPI) score (see Figure 2) by taking indicators of the state of global biodiversity based on population trends of vertebrate species from around the world. In 2018, WWF published an index based on scientific studies referring to government reports and scientific journals that assessed 16,704 populations of 4,005 species of mammals, birds, reptiles, amphibians, and fish, or about six percent of the world's vertebrate species.[20]

Collecting data on the existence of biodiverse populations for the purposes of building a more sustainable life is an important benchmark. The existence of animals and various types of flora and fauna reflects the capacity of the planet's sustainability. Vertebrate extinction indicates the absence of the ecosystem that supports them. The existence of vertebrates is an essential link in the life cycle. The extinction of various types of bats and birds will be followed by an increase in pests and delays in the distribution of seeds needed by the ecosystem to accelerate the succession process into a solid and stable habitat. The death of the ecosystem will be followed by the loss of species that help humans and the extinction of specific habitats.

16. Emil Salim, *Ratusan Bangsa Merusak Satu Bumi*. (Jakarta: Penerbit Kompas, 2010).
17. JO'Brien, J., & Palmer, M. *The Atlas of Religion* (University of California Press. 2016).
18. See, Pengantar Emil Salim dalam Mangunjaya, dkk (eds.), *Menanam Sebelum Kiamat*. Jakarta: Yayasan Obor Indonesia, 2007).
19. Penghitungan atau kalkulasi ekologi dijelaskan dalam Mangunjaya, *Bertahan di Bumi,* (Jakarta: Yayasan Obor Indonesia, 2008), page 97-110.
20. M Grooten and Almond (Eds.), WWF, *Living Planet Report - 2018: Aiming Higher* (Switzerland: WWF, Gland, 2018).

WWF's LPI report states that global biodiversity trends, as measured in thousands of populations of vertebrate species across the globe, show a decline of 60 percent between 1970 and 2014, i.e. over the course of 44 years. Such a decline has not occurred since prehistoric times. Furthermore, although natural extinctions exist, they occur thousands and even hundreds of thousands of years apart. Thus, the existence of humans significantly affects the existence of living things and causes extinctions on earth.[21]

Population declines have mainly occurred in the tropical zones. For example, by 2014, South and Central America had lost 89 percent of their species population as compared to 1970. The number of freshwater species has also decreased dramatically, with the Freshwater Index showing an 83 percent decline since 1970.

The 'ecological footprint' (the quantity of natural resources humans use), which is based on the ability of an ecosystem to renew itself, is called biocapacity. Biocapacity is the capacity of an ecosystem to produce useful biological materials as well as its ability to absorb waste materials produced by human activities. Absorption can occur by natural methods or technology. In other words, biocapacity indicates the ability of an ecosystem to support biologically productive life. Of course, not all of the earth's surface is productive, for example, a desert that is neither overgrown by plants nor inhabited by living things. An individual's ecological footprint and biocapacity are measured in global hectares (gha), i.e., the number of hectares of biologically productive area with average world productivity. Thus, biocapacity and ecological footprint provide an empirical basis for determining whether humans live according to the standards provided by the planet and for observing how the dynamics change over time.

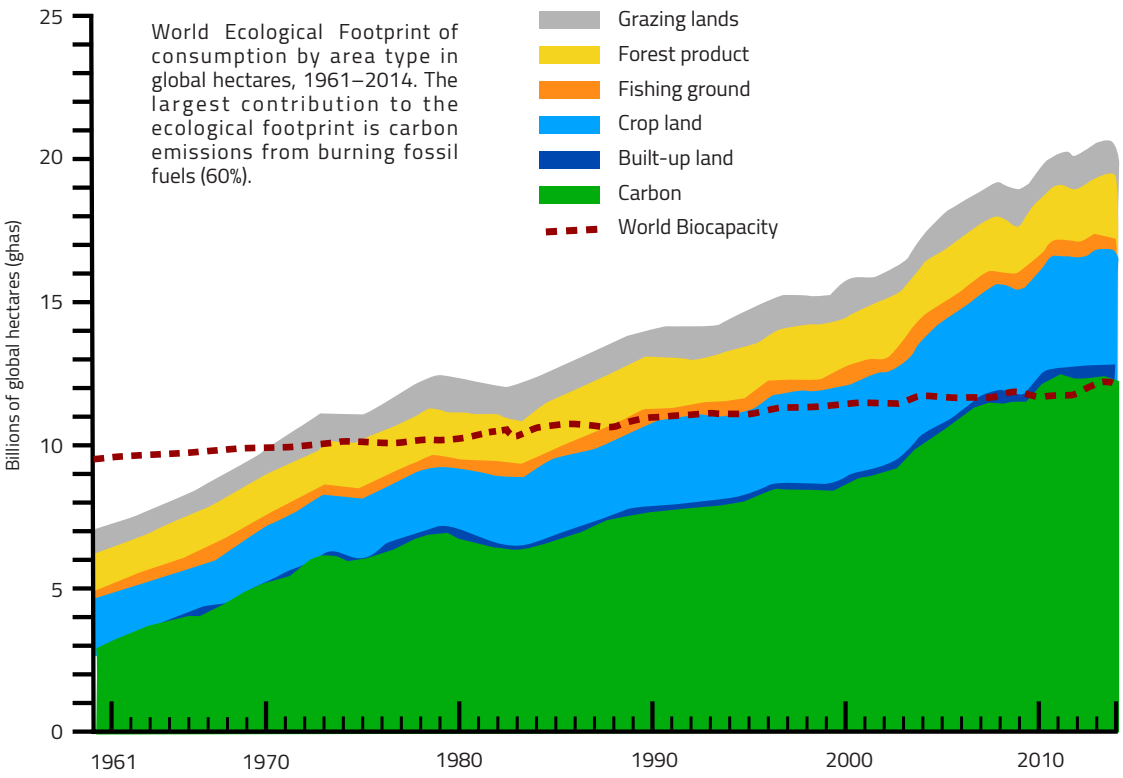


Figure 2: Global trends of the world's ecological footprint for consumption of natural resources, such as forests, grasslands, fishing grounds, agriculture, cultivated land and carbon stocks. The dotted line is the world biocapacity (WWF 2018).

21. See, Elizabeth Kolbert, *The Sixth Extinction: An Unnatural History*. (US. UK: Henry Holt & Co., 2014).

Figure 2 shows average human consumption since the 1980s, which has passed the 10 billion global ha threshold.

The massive consumption of these resources is due to the invasion of technology. Human inventions, such as heavy equipment like tractors and machines, accelerate massive land clearing. WWF notes that biocapacity has increased by about 27 percent in the last 50 years. As a result, the ecological footprint has increased by around 190 percent over the same period (WWF 2018).

The value of gha differs between developed and developing countries, because the two groups of countries have different lifestyles. Natural resources are spread unevenly across the globe, so human consumption patterns, including lifestyles, depend on their needs. Natural resources consumed can also be extracted from other countries. The ecological footprint of Americans and Europeans is higher than that of Asian and African nations due to different lifestyles and needs.

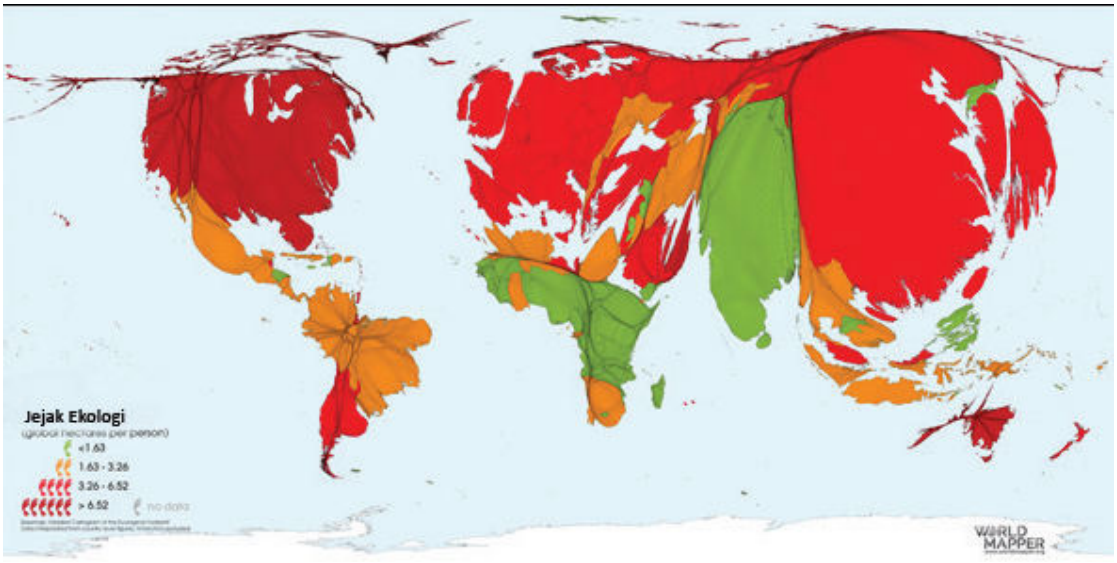


Figure 3: Global map of the ecological footprint of World Mapper 2019. Poor countries are green <1.63 gha; developing countries are orange with JE 1.6-3.26, while the developed countries are red and dark red, with more than six global hectares (gha). If we follow the direction of a more advanced lifestyle, six more planets are needed so that resources do not run out. (Sumber: www.worldmapper.org).

Thus, each country's ecological footprint reflects the level of consumption and lifestyle of its citizens, which includes: the amount of food, use of goods and services, natural resources, and energy, as well as carbon dioxide emissions that pollute the environment. Therefore, looking at the Ecological Footprint map in Figure 3, the developed countries that are wasteful have high gha compared to poor and developing countries.

In a simple terms, gha is one planet earth, so if two gha are needed, it can be rounded up to two planets. The calculation of the ecological footprint shows that the more luxurious and convenient human life is, the more resources will be used. Those resources will quickly decrease until completely depleted. Therefore, being frugal and modest (*Zuhud*) in consuming environmental resources is a *Jihad* to preserve the environment and our planet.

Earth's Safe Planetary Boundary

The real goal of humans in controlling the rate of climate change is to keep the Earth in balance. Greenhouse gases (GHGs) such as CO2 are beneficial for Earth in order to keep the Earth warm and not covered with ice. Based on millions of years of facts from Paleoclimate research, the Earth's equilibrium occurs because the CO2 in the atmosphere is below 450 units per milliliter volume ppmv.[21] So what will happen if the atmospheric concentration is covered with thick CO2 above 450 ppm?

Rockstrom et al. (2009)[22] wrote that the boundary for CO2 concentration in the atmosphere should not exceed 350 ppmv. Violating these limits risks triggers sudden environmental changes to ecosystems on a global scale. Furthermore, an article published in the Nature Journal indicates that the concentration of CO2 in the atmosphere should not exceed 350 ppmv, and that radiative forcing (solar power) should not exceed 1 watt per square meter compared to the pre-industrial period, as shown in Table 1.

Table 1 Planetary Boundaries (Rockström et.al. 2009)

EARTH-SYSTEM PROCESS	PARAMETERS	PROPOSED BOUNDARY	CURRENT STATUS	PRE-INDUSTRIAL VALUE
Climate Change	Atmospheric carbon dioxide concentration (ppmv)	350	387 (400)*	280
	Change in radiative forcing (watts per meter squared)	1	1,5	0
Rate of biodiversity loss	Extinction Rate	10	>100	0,1-1
Nitrogen cycle	Amount of N2 removed from the atmosphere for human use (millionsof tons per year)	35	121	0
Phosphorus cycle	Quantity of P flowing into the oceans	11	8,5 - 9,5	-1
Stratospheric ozone depletion	Concentration of ozone (Dobson unit)	276	283	290
Ocean acidification	Global mean saturation state of aragonite in surface sea water	3,75	2,90	3,44
Global freshwater use	Consumption of freshwater by humans (km3 per year)	4000	2600	415
Atmospheric aerosol loading	Overall particulate concentration in the atmosphere, on a regional basis			
Chemical pollution	For example, amount emitted, or concentration of persistent organic pollutants, plastics, endocrine disrupters			

Source: Rockström et al, 2009.

21, Turner, W. R., Oppenheimer, M., and Wilcove, D. S. "A force to Fight Global Warming", Nature, vol 428, 2009, page 278–279.
22. Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin III, F. S., Lambin, E., ... & Nykvist, B. Planetary Boundaries: Exploring the Safe Operating Space for Humanity, *Ecology and Society*, 2009, 14(2).

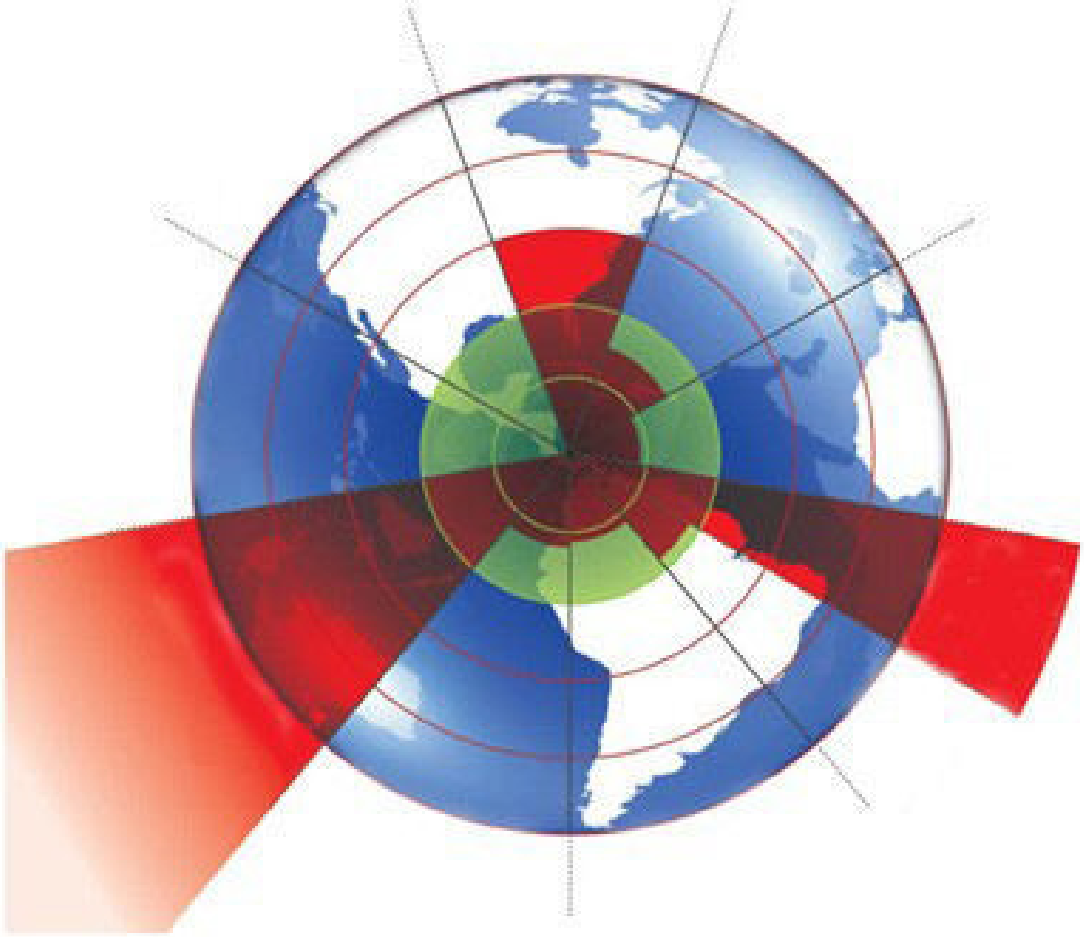


Figure 4: Human activities have pushed the planet's capacity into a state of danger (the red color is the hazard threshold) that includes: rate of biodiversity loss, climate change, and human interference with the nitrogen cycle (Picture adopted with permission of Rockström, et al 2009).

Violating these boundaries will raise the risk of irreversible climate change, such as the loss of ice sheets, the acceleration of rising sea-levels and harsh shifts in forest and agricultural systems. The present CO2 concentration stands at 387 ppmv (as of 2020 it has reached 400 ppm— the author) and the transformation in radiative forcing is 1.5 W m–2. We are also affected by climate change with the extreme shifts in the climate and weather on earth.[23]

That was the impact of industrialization: using large amounts of fossil fuels for energy resulted in higher emissions and concentrations of CO2 in the air and added to the thickness of the atmosphere.

Climate change from the perspective of the Qur'an is the evil caused by men's hands (Surah Luqman, 31: 41).

23. Rockström, J., W. Steffen, K. Noone, Å. Persson, F.S. Chapin, III, E.F. Lambin, T.M. Lenton, M. Scheffer, C. Folke, H.J. Schellnhuber, B. Nykvist, C.A. de Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P.K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R.W. Corell, V.J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J.A. Foley, dalam "A Safe Operating Space for Humanity", *Nature*, 2009, pp. 461, 472-475, doi:10.1038/461472a.

Scientific verification conducted by the Intergovernmental Panel on Climate Change (IPCC) in 2007 stated that humans cause global warming. This conclusion is based on the fact that humans violate the balance. Allah SWT said (Surah Ar Rahman, 55: 5-9):

> "The sun and the moon follow a reckoning, and the stars and the trees all prostrate themselves, and He has raised up the heaven and has set a balance that you may not transgress in the balance."

Muslim scientists notice that climate change is caused by a human failure to maintain balance and to preserve the specific ideal size and quality of Earth's balanced atmosphere.
In the Qur'an, it is stated:

> "And the earth have We spread out, and placed therein firm hills, and caused each seemly thing to grow therein." (Al Hijr 15: 19)

> "Lo! We have created everything by measure." (Al Qamar (54:49)

Indeed, this earth was shaped (set) in a balance. Therefore, if an element appears to upset the balance, the Earth reacts by maintaining the balance with another phenomenon that affects life.

Environment in the Islamic World

The world's 1.8 billion Muslims are connected by environmental issues. For example, in 2007 in Saudi Arabia, tens of thousands of camels died suddenly, allegedly due to poisoning, antibiotic pollution, viruses, and possibly climate change.[24] Likewise, pollution due to wars such as in Iraq and Syria has created a scourge and deep trauma of which the public is often unaware because it has gone unreported.

Arab countries are at a disadvantage due to their tendency to experience harsh climatic conditions: water quality and quantity, sea level, human health, food security, and changes brought by tourism. Although countries in the Arab World have tried to adapt or reduce the impact of climate change, they still face many challenges. Arab countries are working together to find alternative fuel sources to oil.[25] In the last five years, several countries have experienced wars. Those conflicts, such as in Yemen and Syria, have resulted in great misfortune and prolonged hunger.

At the end of the Gulf War, in March 1991, some 650 unmanaged oil wells spilled and were torn apart. This situation resulted in 25-30 million barrels of crude oil contaminating the area and turning 19 km2 into a lake. Nine months after the war, around November 1991, those areas were restored.[26]

24. MC Kie, "Camel 'plague' puzzles scientists," *The Observer*, December23, 2007.http:// www.guardian.co.uk/science/2007/dec/23/animalbehaviour.science.
25. Al Mebayedh, H, "Climate Changes and Its Effects on the Arab Area", APCBEE *Procedia* Volume 5, 2013, Pages 1-5 https://doi.org/10.1016/j.apcbee.2013.05.001
26. Birdlife International. "Threats to the environment posed by war in Iraq". http://www. scienceinafrica.co.za/2003/march/war.htm10/14/2010 2:14 PM

The Islamic world, generally in the Middle East and North Africa (MENA) region, faces the problem of environmental damage, due to several factors:

1. Damage and degradation of natural resources and biodiversity,
2. Land and water pollution,
3. Climate change, and
4. Clean water crisis.

Muslims in Indonesia, the largest Muslim population globally, face challenges in managing natural resources. Numerous parties in this country, especially environmental activists, are experiencing an alarming decline. In addition, three global phenomena of environmental damage in Indonesia have a real and pressing impact. For example, the degradation of natural resources due to deforestation has resulted in the loss of property and lives. Meanwhile, pollution often occurs on soil and land contaminated by mining excavations and industrial waste, or even toxic and hazardous waste (B3). In addition, several types of waste from developed countries are exported to Indonesia for recycling. However, not all this waste is recycled. The excess is used as fuel for producing tofu. This process causes the food to contain chemical substances, such as dioxins, polybrominated diphenyl ethers, polychlorinated biphenyls, and short-chain chlorinated paraffin. Burning plastic waste in tofu production has been ongoing for 20 years.[27]

The Indonesian Ministry of Environment recorded that in 2007 around 13 thousand large and medium-sized industries and around 94 thousand small industries had potential to pollute surface water and groundwater.[28] The phenomenon of global warming with extreme rainfall during La Niña[29] — September–October-November 2020 — requires caution and carefulness, especially in places prone to landslides.

As inhabitants of the earth, Muslims and adherents of other religions could be accused of becoming the cause of the environmental crisis — amid the hegemony of hedonism — and the degradation of planet earth. Accused of being the cause of the environmental crisis, Muslims can act to provide solutions.

Taking Steps and Actions

In July 2009, more than 70 religious scholars, environmentalists and activists from across the Muslim world gathered in Istanbul, Turkey, to support the Muslim Seven Year Action Plan for Climate Change Action (M7YAP). Those in attendance included Dr. Yusuf Al Qardhawi, (Chairman of the International Union of Muslim Scholars); Dr. Ali Jum'a (The Mufti of Egypt); Dr. Ekrama Sabri, (The Mufti of al-Aqsa); Dr. Salman Alouda (Saudi Arabia); Ali Mohamad Hussein F*Ad*lallah (the Lebanese Shiah scholar); Islamic Educational, Scientific and Cultural Organization (ISESCO); Muslim American Society (MAS), Representatives of Ministries of Environment and Awqaf, Kuwait, Bahrain, Morocco, Indonesia, Senegal and Turkey, USA, UK, Switzerland. In addition, Indonesian Representatives from Nahdlatul Ulama (NU), Muhammadiyah, Ministry of Environment (KLH), Ministry of Forestry and Non-Governmental Organizations (NGOs) were part of the conference.

27. See, "Foto: Di Balik Bara Pabrik Tahu Berbahan Bakar Sampah Plastik" , https://katadata. co.id/foto/2019/11/21/foto-di-balik-bara-pabrik-tahu-berbahan-bakar-sampah-plastik
28. See Kompas, 27 Nov 2019. "Limbah Plastik untuk Bahan-Bakar Pabrik Tahu Sudah Berlangsung 20 Tahun" https://regional.kompas.com/read/2019/11/27/06233751/limbah- plastik-untuk-bahan-bakar-pabrik-tahu-sudah-berlangsung-20-tahun (Jakarta: KLH: 2010).
29. *La Niña* is the cold phase of *El Niño* (Southern Oscillation) and is the opposite of *El Niño phenomenon*. La Niña is derived from the Spanish language, which means daughter. In addition, this phenomenon was also known as anti-*El Niño*, and *El Viejo* which means "the old." *Source*: Wikipedia.

This meeting shed light on the results of discussions from an international conference in Kuwait on 28-29 October 2008, which aimed to:

1. Formulate an Islamic vision for the environment in general and actions to deal with climate change in particular.
2. Recognize and study the interaction between Islamic civilization and the environment and provide a model from existing experiences.
3. Discuss various challenges facing global warming and climate change.
4. Identify the status and characteristics of each country in the Islamic world and compare these characteristics between countries facing climate change challenges.
5. Present projects and pilots that have been carried out in the Islamic world to combat climate change and global warming.
6. List various sources and approaches taken from Islamic teachings and identify aspects that can be applied in dealing with various problems.
7. Develop a final draft of a 7-year blueprint plan that can be implemented in the Muslim world facing global warming and climate change.
8. This plan contains the necessary tools, specific targets and specified de*Ad*line.

In addition to these, M7YAP carries out activities including:

1. Create a *Waqf* to implement the Climate Change plan;
2. Establish Islamic labels for different products. This would be an Islamic environmental labelling system; (*halalan thayyiban*) with strict authenticity standards;
3. Work towards a 'Green Hajj' with the Saudi Minister of Hajj.
4. Aim to have the Hajj free of plastic bottles and introduce environmentally friendly initiatives over the next five to ten years to transform the Hajj into a recognized environmentally-friendly pilgrimage.

Advanced Programs

The follow-up conference, "International Conference to Mobilize Muslims' Action to halt Climate Change," in Bogor, Indonesia, was held on 9-10 April 2010. The objectives of this meeting were:

- to increase the understanding and knowledge of leaders, scholars, experts, scientists, officials, and environmental activists of the Islamic world on the importance of joint action to address the multidimensional challenges of global warming and climate change.
- to encourage dialogue and exchange of experiences and knowledge among Muslim communities from various countries of the world, to develop plans, agendas, and guidelines for how to implement actions and movements to deal effectively with the problems and challenges of climate change in their respective countries and Islamic communities in this world.
- to support Bogor as a "Sustainable Green City," which is recognized by conference participants and as an example of an environmentally friendly city whose implementation will continue to be observed and jointly assisted by its supporters.

Some agreements and recommendations as follow-up steps to the Islamic Conference on Climate Change in Bogor have been reached:

1. Conference participants agreed on the importance of strengthening the scientific and technological infrastructure in various countries and among Muslims to face the challenges of global warming and climate change. For this reason, it is necessary to build a network of cooperation among universities, colleges, and centers of Islamic studies (to be pioneered by UIN Syarif Hidayatullah, Jakarta). This partnership will galvanize the cooperation of scientists and scholars from the Islamic world, with long-term insight to develop an "Islamic brain trust" to assist Muslims in various countries in thinking and planning so as to implement climate change mitigation and adaptation efforts as well as low-carbon patterns of activities and development.
2. Among the main objectives are to further encourage the re-integration of science with Islamic teaching and the development of education systems to achieve sustainable development.
3. The agreement to cooperate with the Organization of Islamic Conference/the Organization of Islamic Cooperation (OIC) to consolidate the role of Islamic countries in building a platform or a common position at the 16th COP negotiation forum UNFCCC (United Nations Framework Convention on Climate Change) in Mexico in late 2010, which will be initiated by a small group of Bogor Conference participants and leaders of the Organization of the Islamic Conference (OIC).[30] In addition, the Bogor Conference participants agreed to propose to the OIC to form a special Council or Commission on Climate Change whose task is to assist and protect Islamic countries from the impact of global warming through the development of appropriate climate change mitigation policies, environmentally friendly technology, socially and environmentally responsible corporate business practices, and the application of people's behavior and lifestyles following Islamic values.
4. Supporting the declaration of Bogor as a Sustainable Green City is the first step towards achieving the city of Al-Khair in Indonesia. Either through the potential support of the Muslim Association for Climate Change Action (MACCA) or the support of other institutions and parties, the Bogor Conference participants agreed to support the development of international criteria and standards for cities that can be categorized as "sustainable green cities" or "Al Khair city" in the Islamic world. The guidelines for green city planning and spatial planning, the development of a monitoring and evaluation system and an accountability mechanism for a city that holds the status of a sustainable green city are necessary.

The conference sent reports and conclusions to several embassies in Indonesia and to the Organization of Islamic Cooperation (OIC). This conference is a form of solid support for state members of the OIC to move forward and to pay attention to climate change.

30. This recommendation was sent to the OIC Secretariat and representatives of Muslim countries in Indonesia through their embassies in Jakarta. The document can be accessed here: Statement of Muslim Conference on Climate Change Action, Bogor 2010 http://ppi.unas.ac.id/muslim-conference-on-climate-change-action-bogor/.

Chapter 3
Ecology and Climate from the Perspective of Islamic Science

"And the earth have We spread out, and placed therein firm hills, and caused each seemly thing to grow therein." (Al Hijr (15):19)

Introduction

Earth, a place inhabited by humans, is the only planet suitable for supporting life. All the diverse living (biotic) and non-living things have mutually supportive, interrelated, and intertwined functions. Such components should always be maintained. The absence or damage of one of the Earth's components, which is 4.6 billion years old,[1] has a destructive impact on life and on the sources of life that exist to support the stability of all creatures.

Planet Earth, the only proper place to live for humankind, is now fragile due to the many human activities that tend to cause damage. That threatens the very existence of the earth. The damage caused turned out to be beyond the earth's carrying capacity. Moreover, advances in science and technology have accelerated the depletion of natural resources. Earth provides natural resources such as water, minerals, oxygen, and other living things that are very important for life, but which exist in minimal quantities.

From the beginning, neither the earth nor its resources have expanded. Each new discovery is only part of a cycle, an update of what already existed (renewable), or an invention based on human knowledge. However, if this cycle is disrupted, there will be imbalance, chaos, and disharmony that will result in deterioration.

This chapter describes Islamic principles on ecology and modern scientific knowledge related to efforts to understand the text of the Qur'an as a revelation in the context of modern ecology, which has developed greatly in the 21st century.

1. In the scientific method, the calculation of the age of the earth is achieved by calculating the age of the earth's neighboring rocks such as the moon and falling meteors. Earth is 4.54 billion years old, with an error range of 50 million years. https://www.space.com/24854-how-old-is-earth.html (Retrieved October 14,2019).

Ecology in the Islamic Science Framework

Islam has an essential concept of nature. As Muslims, we must admit and believe that the heavens, the earth, and everything in them are the creations of Allah SWT. Revelation, apart from explaining the origin, creation, and development of the universe, also explains the universe's status and position as one of Allah's creations. Allah SWT states that the creation of the heavens and earth in the universe is even greater (more complex and more sublime) than the creation of humans.[2] The Qur'an explains the role of nature with respect to humans and their responsibilities in managing and maintaining the nature that He created. From revelation, we know the Divine Principle. The result of the unity of nature is an essential embodiment in Islam that reflects a single intention (unity or *Tawhid*) that overshadows all elements, which depend on Him.[3]

Muslim scientists must be guided by the Qur'an as a source of knowledge. According to SH Nasr (1976), the framework of revelation as science is called Islamic Sciences, which is universal, not dividing religious and scientific knowledge. This opinion explains that developing science (especially the natural sciences) is an attempt to formulate what constitutes a *sunatullah*.[4]

Agus Purwanto, Doctor of Physics and a graduate of Hiroshima University, Japan, is an expert in the field of neutrinos, thermal field theory, extra dimensions and the birth of an asymmetric universe or baryogenesis. A. Purwanto defines Islamic Science as a science based on revelation, which is part of epistemology, ontology, and axiology. The practical approach is to conduct a logical analysis of the revealed text and compare it with observations of nature. The logic of reason used is logic or reason that ordinary people easily understand.[5] Furthermore, Baharuddin concluded that Islamic science is a science that sees the original nature as a sign (verses) of Allah who created and continues to protect it.[6] According to SH Nasr's observations, Islamic Science existed in the understanding of earlier Islamic scholars:

> "Muslim scientists who study the cosmic or ontological Qur'an… see that every creation is a letter and word and page of the cosmic Qur'an… they are well aware of the fact that the Qur'an speaks of natural phenomena and even the human spirit as a verse (which is translated as signs) terms used in the Qur'an… So for the (Muslim-sic scientists) the forerunners, all that is natural is a verse of Allah."[7]

Allah is one; He is the Creator, and there is no other god but Him. "There is no other god," as the principle of *Tawhid*, reflects the interrelated integrity of creation.[8] Philosophically, Islam teaches the importance of humans protecting what Allah SWT has created as al-Khaliq, so that humans do not make mischief on earth.[9]

2. Surah Ghafir (40):57
3. Sayyed Hossein Nasr, An Introduction to Islamic Cosmological Doctrines (Harvard University Press, 1964).
4. Sayyed Husein Nasr in conversation with Muzaffar Iqbal. "The Meaning, Scope and Future od *Islamic Sciences*." Islamic Sciences. Summer 2013. Vol 11 (1): 63-78.
5. Agus Purwanto, *Nalar Ayat-Ayat Semesta* (Bandung: *Mizan*, 2008), page. 12.
6. Azizan Baharuddin, *Harmony between Religion and Science. An Islamic Perspective*. (Kuala Lumpur: IKIM 2019).
7. SH Nasr, "the Need of Sacred Science …" quoted from Fazlun Khalid. *Signs on the Earth: Islam, modernity and the climate crisis* (Kube Publishing Ltd. 2019), page. 151.
8. See QS 21: 22: 022. "If there were gods beside Allah, then verily both (the heavens and the earth) had been disordered. Glorified be Allah, the Lord of the Throne, from all that they ascribe (unto Him)."
9. Surah Al Baqarah (2): 60, 205.

Allah SWT encompasses everything, as we believe whatever is in the heavens and in the earth belongs to Allah SWT.[10] Hence, the Qur'an delivers the understanding that the universe and its contents are not objects but subjects for humans. Allah SWT provides knowledge that He created other creatures just like He created humans.[11]

Allah who give life to and takes care of all creatures, controls the heavens and the earth.[12] According the basic principles of life science, this is referred to as the science of ecology, a branch of science that studies the "living things" or the interaction between living and (so-called) non-living things.

In modern ecology, creatures on earth are divided into living (biotic) and non-living (abiotic) things. Meanwhile, universally, Islam views all creatures on earth and in the sky as objects with a function and a living spirit that glorifies Allah SWT. For thunder[13] and the seven heavens and the earth[14] and all that is therein praise Him.[15]

Thus, according to revelation, everything in the heavens (the universe) and the earth has a meaning and function and is interrelated with one another. Therefore, everything on this earth is a mere means to show that what was created is a unity that cannot be separated because all are devoted to Allah SWT, so that we also understand that the creator is one Allah (*Tawhid*).

In their principles on cosmology, Ikhwan al-Shafa stated:

> "All this world is one, as one city, or as one animal, or as one human torso. Its pieces integrate into a single unit like an organ of a living being which continue to grow by Allah's grace."[16]

The basic principles of cosmology are fundamental because our lives (as Muslims) and understandings are based on revelation. Moreover, many examples and lessons from the revelation provide an understanding of how to maintain the harmony of nature. However, humans have just realized the importance of that lesson. A real example is the great flood story in Prophet Noah's era. Allah SWT ordered Prophet Noah to bring all kinds of animals into his ark in order to maintain the diversity of animal species so that they would not become extinct, as the verse of the Qur'an states:

> "Thus it was until Our command came to pass and the oven boiled over. We said: 'Take into the Ark a pair of every species; and take your own family except those who have already been declared (as unworthy); and also take everyone who believes. But those who, along with him, had believed were indeed just a few." (Surah Huud, 1 1:40)

10. An-Nisaa (4): 126.
11. Al-An'am (6): 38.
12. Surah Al Baqarah (2): 225.
13. Surah Ar Ra'du (13): 13.
14. Surah Al Israa (17): 44.
15. Surah Al Anbiyaa (21): 79, 24:41.
16. Ikhwan al Shafa as quoted by SH Nasr, *Introduction to Islamic Cosmological Doctrines* (Cambrigde: The Belknap Press 1964), page. 44.

Based on this revelation, the Qur'an provides clues regarding the importance of the animals' existence. They support human welfare when Noah's boat lands safely as the great flood recedes. In conclusion, this revelation teaches the real power of conservation.[17]

Fuqaha (fiqh experts) and environmentalists who carefully study the text have mutually supportive views on environmental conservation activities. Al Hafiz BA Masri, for example, noted that there are at least 500 verses of the Qur'an that can be regarded as guidance for humans regarding their treatment of the environment.[18]

Fazlun Khalid (Founding Director of the Islamic Foundation for Ecology & Environment Sciences based in Birmingham, England) suggests that one approach to apprehending the natural world around us, including environmental conservation activities, is to understand Creation (*al-khalq*). According to him, this approach is also called *Ilm al-khalq*, or the science of creation itself. To learn this, the Qur'an includes 261 verses derived from the word *kha-la-qa* (to create).[19] In Tafsir Al-Jawahir, Shaykh Thantawi writes that in the Holy Qur'an there are more than 750 verses relating to Kauniyah and around 150 relating to fiqh. Purwanto, in his book, *Ayat Ayat* Semesta: *Sisi Al-Qur'an yang Terlupakan*, examines 1,108 verses related to the Kauniyah that mention water, fire, moon, earth, sky, sun, zarrah (atom) and so on.[20]

The Qur'an is undoubtedly a powerful force because it is a guide for mankind and the Criterion (of right and wrong).[21] The first revelation of the Qur'an is Surah *al-khalq* (96:1) which emphasizes the need to read: "Read: In the name of your Lord Who created." This verse is a command that comes with the word "read" without presenting the read text. This verse provides clear instructions to understand and learn from the Almighty Creator of the universe, the earth and its contents, all of which are tokens (of His Sovereignty).[22] Dr. Agus Purwanto describes the natural laws as the verses of Allah in formulas of theoretical physics, which also provide clues to the existence of living things (biological).[23]

Hence, a Muslim should read two things: the Qauliyah verses — written in the text of the Qur'an — and the Kauniyah verse, signs that exist in the universe. Therefore, the effort to maintain the existence of all creatures on earth and to fight for its sustainability is an effort to protect the verses and gifts of Allah SWT. To destroy the earth can also mean destroying the signs of Allah's power. Thus, this Islamic scientific perspective is an excellent axiological paradigm that is easy to implement.

17. See, Fachruddin Mangunjaya, *Bahtera Nabi Nuh, dalam Mempertahankan Keseimbangan*. (Jakarta: Yayasan Obor Indonesia), 2015, page. 47.
18. Hafiz, BA Masri, "Islam and Ecology", in Fazlun Khalid and J O'Briend (eds) Islam and Ecology. (London: Cassel. 1997) page 2.
19. Fazlun Khalid, *Al-Qur'an Ciptaan dan Konservasi (Translated by: Kafil Yamin). Islamic Foundation for Ecology and Environmental Science (Jakarta: Center for Islamic Studies, UNAS 1999).*
20. Agus Purwanto, *Ayat-ayat Semesta: Sisi Al-Qur'an yang Terlupakan* (Bandung: *Mizan* 2011) page.24.
21. Surah Al Baqarah (2): 185.
22. Surah Ali Imron (3):190-191.
23. Agus Purwanto. *Nalar Ayat-ayat Semesta. Menjadikan Al-Qur'an sebagai Basis Kontruksi Ilmu Pengetahuan*. (Bandung: *Mizan*. 2012).

Khalid stated that responding to the climate crisis is facilitated by an awareness that all of Allah's creations that exist on earth are Allah's verses.[24] The verses of Allah SWT on this planet earth are currently experiencing extinction and facing an extraordinary threat due to human activities. At the end of 2019, the Intergovernmental Science- Policy Platform on Biodiversity and Ecosystem Services (IPBES) reported that the extinction of creatures on Earth today is moving at a faster rate than extinctions in previous eras. These extinctions have occurred, among others, due to overexploited land and extraordinary environmental pollution. The panel discussion of world scientists at the IPBES forum noted that the average abundance of native species in terrestrial habitats has fallen by 20 percent since the 19th century. This period of unusual mass extinction at the hands of humans is called the Anthropocene.[25] Planet Earth is experiencing its sixth mass extinction event (See Figure 3.1), marked by the endangerment of 40 percent of amphibian species and the degradation of 33 percent of coral reef animals that form clumps. [26]

The important implications for humans if these species become extinct would be the loss of the ecosystem chain that links all living beings.

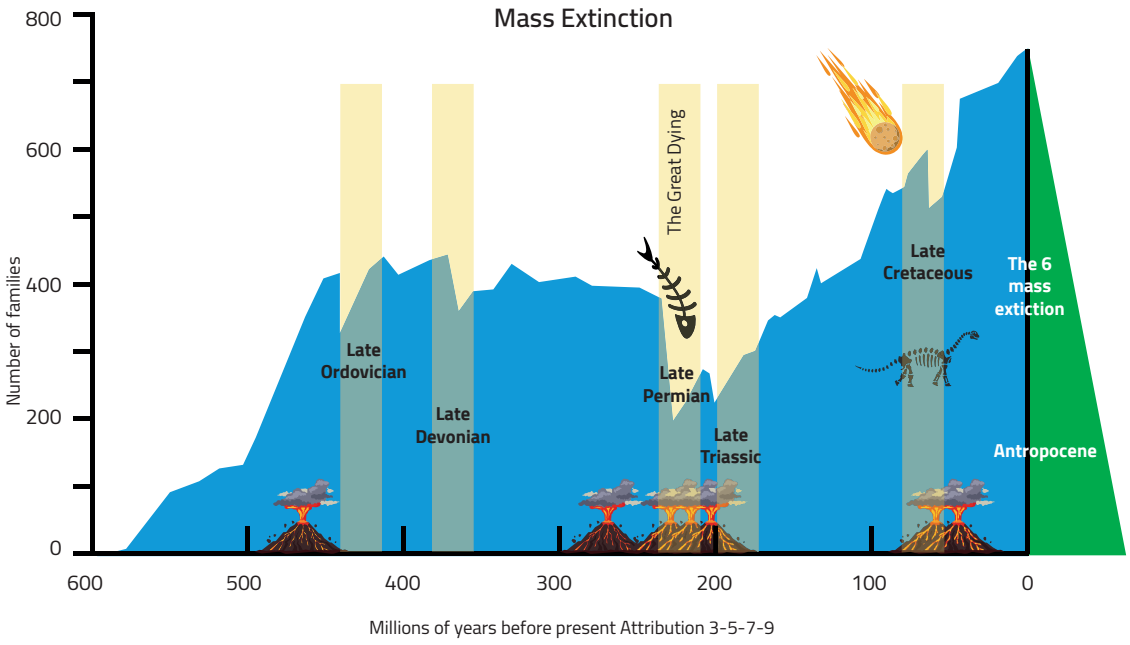


Figure 3.1: Sixth mass extinction: Most species' extinctions were caused by sudden disasters and changes in Earth's history.[27] (modified from Kolbert, 2014)

24. Fazlun Khalid, Signs on the Earth: Islam, Spirituality and Climate Crisis. (UK: Kube Publishing, 2019).
25. The term Anthropocene has been commonly used since 2011 to describe the period of human presence. It is marked by the advent of the 17th century Industrial Revolution.
26. IPBES, Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors) "Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services." (Bonn, Germany: IPBES Secretariat, 2019). Available at https://www.ipbes.net/global-assessment-report-biodiversity-ecosystem-services.
27. Elizabeth Kolbert, *The Six Extiction: An Unnatural History*. (New York: Picadorusa, 2014), page. 17.

For example, moving close to tropical forests in Borneo, the existence of orangutans as seed dispersers will cease to function if these primate species become extinct. Stawski's research shows that male and female orangutans share the proportion of seed distribution; female orangutans spread seeds around their parent tree in peat forest areas, while male orangutans scatter seeds randomly and far from the parent tree. Female orangutans digest fruit and release seeds through their feces after 76 hours. The presence of orangutans also accelerates plant regeneration by uprooting rotten wood and creating gaps in the canopy so that the plants beneath the trees receive sunlight to grow. The balanced ecosystem is also supported by other species, such as hornbills that spread seeds. The hornbill can spread 748 seeds of plant species belonging to 252 genera.[29]

Allah created, then He allowed us to understand and maintain nature. That is a form of human responsibility. According to His instructions, humans are permitted to take advantage of nature (as His creation). Nature was created for humans, but humans are forbidden from exploiting and destroying nature and the environment. Prophet Muhammad SAW taught us that nature has rights.[30] Animals and plants have rights. More than that, humans are also given the freedom to obtain rights and obligations. Humans are the only creatures gifted with logic and the ability to gain knowledge, to differentiate good from evil, and to recognize rewards and sins.

Humans have a right to use nature but are also burdened with a moral obligation. Accordingly, the use of natural resources must be contained within the ethical principles established by Allah SWT.[31]

In this regard, the four main principles of Islam towards the environment are (i) *Tawhid*, (ii) *Khilafa*h, (iii) *Mizan*, and (iv) *Fitrah*. These principles are themes in the Qur'an that can be elaborated to educate and increase public awareness of how to manage natural resources and the environment. These four principles will be discussed in the context of a universal message about the environment, referring to the opinions of Islamic scientists and scholars.[32]

As part of His creation, we should be aware that natural resources have limitations. So far, we have not known of or found other planets as good as Earth as a place suitable for life. Earth, which is 4.6 billion years old, has a dynamic geological history, but its existence and wealth are limited, and its area is not increasing. According to one study, 70 percent of the Earth's surface is covered by water, and habitable land is limited.

The earth's surface consists of 30 percent land (148.3 million square kilometers) and 361.8 million square kilometers of water, which makes up 70 percent.[33] According to the ecological footprint calculation, only 12 billion ha or 120 million square kilometers of land[34] is productive and can support human life. The state of suitable land or nature on Planet Earth is called biocapacity. Biocapacity is usually expressed by life carrying capacity, such as a good ecosystem, adequate water, and air that allows for life.

28. Stawski, "The bond between tropical forests and orangutans" *Journal of Experimental Biology*', 2018, 221(11).
29. Kitamura, "Frugivory and seed dispersal by hornbills (Bucerotidae) in tropical forests".
Acta Oecologica, 2011, 37(6), 531-541.
30. See: Fachruddin Mangunjaya. *Konservasi Alam dalam Islam* (Jakarta: Yayasan Obor Indonesia, 2019). page 47-60.
31. Othman Bakar, *Environmental Wisdom for Planet Earth: Islamic Heritage* (Centre for Civilization Dialogue University of Malaya. 2007), p.31.
32. I have written a detailed description of this in *Jurnal Theologia* entitled "Kerusakan Lingkungan: Epistemologi Sains dan Tanggung jawab Manusia" Vol. 6 (1) January–July, 2015, page. 58-71
33. Charles R Coblem; Murray, Elaine G; Rice, Dole R *Earth Science* (Englewood Cliffs, NJ: Prentice-Hall, 1987), p. 102.
34. http://www.worldatlas.com/aatlas/infopage/earth.htm.

Biocapacity is also reflected in the wholeness of the ecological carrying capacity to support the cycle and rotation of hydrology, water, air, and minerals contained therein.[35] This means land that cannot be inhabited by humans, such as deserts or the north and south poles.

Some types of biomes and ecosystems are very complex, such as tropical rainforests, which exist only in tropical areas like Indonesia.[36] Ecologists explain why there is so much biodiversity in Indonesia. The causes for the distribution of biodiversity in certain areas as follows:[37]

- High productivity in the tropics leads to the emergence of many species.
- The tropics are experiencing some of the effects of glaciation— geological changes—that allow many species to evolve and adapt.
- The environment is more stable in the tropics, the temperature is relatively constant, and it rains all year round.
- Increased numbers of predators and disease limit competition in the tropics, causing more species to co-exist.
- Disturbances in the tropics at frequencies that can lead to success in spurring the succession of biodiversity.

The modern human lifestyle, which is extravagant and unwise, is expected to deplete natural resources beyond the earth's carrying capacity. Today, the earth's population is growing to 7 billion and will reach 13 billion in 2025. Can humans balance their use of natural resources and the limited capacity of the earth that will not increase to accommodate human existence?

In this context, the Qur'an provides instructions for how to behave vis-à-vis the earth's resources, a lifestyle with a description of halal and haram.[38] In a broad sense, this lifestyle is used for eco- labelling. Eco-labeling was an effort by experts in the 90s to provide certification or approval of environmentally friendly products that guarantees their sustainability based on a study.[39]

Unfortunately, this certification is often not an option for Muslim countries. In a forum held in Riau which discussed a response to forest fires and sustainable production, local experts recommended that consumer labels in Indonesia consider religious values in labels for consumers, such as halal labels.[40]

In 2009, in a discussion of the Muslim 7 Year Action Plan (M7YAP), an idea emerged that the product consumed should not be only halal (allowed to be consumed according to *Sharia*), but also thayyiban. Halal and thayyiban mean halal; good and environmentally friendly.[41]

35. http://www.footprintnetwork.org/en/index.php/GFN/page/glossary/#biocapacity
36. See, "Major tereterial and aquatic biome", http://www.learner.org/courses/envsci/unit/ text.php?unit=4&secNum=1
37. *Ibid*.
38. See F. Mangunjaya, *Konservasi Alam dalam Islam* (Jakarta: Yayasan Obor Indonesia, 2019). This book discusses Islamic wisdom in consumption, which has a significant impact on environmental conservation.
39. Grunert, K. G., Hieke, S., & Wills, J. "Sustainability labels on food products: Consumer motivation, understanding and use". *Food Policy*, 44, 20kf, pp 177-189.
40. Alfajri, Azhari Setiawan, Helena Varkkey, Matthew Ashfold, Laura De Pretto, Wong Pui Y, Christopher Ives, "Public and Religious Values in the Context of Local and Transboundary Haze Pollution in Indonesia". https://www.tecsea.info/post/public-and-religious-values-in-the- context-of-local-and-transboundary-haze-pollution-in-indonesia (retrieved February 19, 2021)
41. See the document of Muslim 7 Year Action Plan (M7YAP) on climate change, https://loe.org/ images/content/090731/M7YAP_draft.pdf

Islam is a guide for preserving the earth. Hence, the Qur'an prevents Muslims from being extravagant and reckless with resources and discourages Muslims from consumptive behavior. Islam highlights and prohibits an extravagant lifestyle, as in the following verses:

> "Give to the near of kin his due, and also to the needy and the wayfarer. Do not squander your wealth wastefully, for those who squander wastefully are Satan's brothers, and Satan is ever ungrateful to his Lord." (Surah al-Isra': 26-27)

In addition, Muslims should not go overboard in their lifestyle and consumption:

> "O Children of Adam! Look to your adornment at every place of worship, and eat and drink, but be not prodigal. Lo! He loveth not the prodigals." (Al A'raaf : 31).

The reason for observing lifestyle rules begins with a concern for limited resources and attention to the principles of justice. We are ordered to "eat when we are hungry and stop when we are full." That has long been taught in the practice of Islamic life. One such example is fasting to refrain from hunger, thirst and sexual lust for one month each year, so that humans can reflect on what to eat and what to do for the remaining 11 months. Also, it is *Sunnah* for Muslims to perform fasting every Monday and Thursday and to fast for three days each month (*ayyam al beed*). From a psychological point of view, the actual fasting command holds a deeper meaning. Ecologically, fasting is seen as an effort to limit consumption patterns extensively, in both a spiritual and practical sense. Furthermore, fasting is also a reminder to refrain from excessive and unsustainable consumption.

Therefore, the idea of sustainable consumption emerged. The term means that materials are taken from sources which have a low impact on the environment or which are environmentally friendly, i.e. sustainable sources, and do not damage the environment. The Oslo Declaration on sustainable consumption suggested "the use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life-cycle so as not to jeopardize the needs of future generations."[42]

We have seen much pollution on land and at sea caused by human hands. Products such as plastics and single-use items have caused extensive disruption and damage. One example of this is the dead giant whale stranded on the beach because it ate 80 kg of plastic waste.[43]

42. https://enb.iisd.org/consume/oslo004.html
43. https://www.nationalgeographic.com/environment/2019/03/whale-dies-88-pounds-plastic- philippines/ March 2019, retrieved September 25.

Maintaining Balance

In this modern era, we encounter a worrying environmental crisis; the Earth created by Allah SWT is experiencing massive degradation or damage locally, regionally, and globally. With all its resources and support, humanity must realize and understand that the Earth has limitations and is not eternal. Humanity's accelerated depletion of the Earth's resources has exceeded its carrying capacity. As an illustration, 1,300 scientists from 95 countries who researched ecosystems across the world reported in the Millennium Ecosystem Assessment (MEA) in 2005 that:

> "Humans have made major changes to ecosystems in the late 20th century, which has never been done in human history... these changes increase human well-being but are also accompanied by increased damage."

This report reminds us that humanity's oppression will degrade two- thirds of the natural support systems that sustain life:

> "Human activity is putting such a strain on the natural functions of the earth that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted."[44]

This damage is clear in the destruction and degradation of Indonesia's environment, especially natural systems. One such example is the extensive illegal logging of forests, which are then turned into oil palm plantations. Additionally, the creation of ponds destroys the mangrove ecosystem. Mangroves are significant as they provide natural ecosystems for fish and shrimp to spawn and breed.

The Earth's productivity will soon be lost, along with the interrelated and mutually supportive life chains, known as ecosystems. An ecosystem is a collection of living and non-living things, biotic and abiotic, with mutually supporting functions. These form the area called an ecosystem, which is capable of supporting an output or product that benefits humans. Mangrove forest ecosystems, for example, facilitate nesting and spawning sites for shrimp and mangrove crabs, as well as for hundreds of species of fish in the surrounding waters. This ecosystem thereby supports the value of fishery by providing income for fishermen. If this ecosystem is lost, fishermen's catch will decrease, along with their income.

According to the Indonesian Institute of Sciences records, Indonesia has more than seventy-four types of ecosystems. However, human knowledge still does not fully comprehend their function.

Changes in the ecosystem can be detected through biological indicators (bio-indicators); the more an area changes, the more the biological indicators change.[45]

44. Millenium Ecosystem Assessment (MEA), *Ecosystem and Human Well-Bering: Synthesis* (Washington: Island Press, 2005).
45. Indonesian institute of sciences / Lembaga Ilmu Pengetahuan Indonesia, *Kekinian Keanekaragaman Hayati Indonesia*. (Jakarta: LIPI, 2014), page 221.

Changes that occur due to damage to one component of the ecosystem mean that certain areas no longer function properly to support life. As a concrete example, damage to the marine ecosystem of coral reefs carried out by fishermen who catch ornamental fish by blasting and poisoning them with potassium decreases their yield. These activities damage coral reefs, causing plankton and micro-organisms that feed fish to die. As a result, fish lose their habitat and their food source.

The peat ecosystem on the banks of rivers in Kalimantan captures carbon and is an essential habitat for freshwater fish. Peat is formed over millions of years by natural processes in which litter (organic waste in the form of dry leaves, tree branches, and various other vegetation residue on the forest or swamp floor), humus, and weathered leaves have piled up. Peat swamp forests in South Sumatra which are around 3-7 meters deep can absorb 32-35 million tons of carbon.[46] This amount is greater than the total annual carbon dioxide output of the United States of America.[47] Thus, peat habitats and forests absorb carbon dioxide released into the air, reducing emissions and pollution and thereby maintaining climate balance.

In addition, the peat habitat widespread in Kalimantan and Sumatra plays a vital role for hundreds of plant species which only grow in these habitats. Hence, unique species, such as jelutung and ramin trees, have emerged and cannot be found in other areas. These forests therefore contain various types of ecosystems and diverse biological assets. This must be valued as a great gift from the Creator. That gift has been entrusted to us, the Indonesian people, to maintain and use sustainably and without destroying it.

In the context of ecosystem diversity, Indonesia and Malaysia play a significant role. For example, tropical forest ecosystems are integral to the Earth's climate balance. If this nation can maintain and preserve its natural heritage, it will contribute to maintaining the balance of nature on Planet Earth and to the sustainability of human civilization.

Islamic Declaration on Global Climate Change

Since the 1960s, Islamic scientists have endeavored to think about and view ecology in the context of Islamic theology and theory. One such pioneer was Seyyed Hossein Nasr, one of the world's leading thinkers in Islamic science and spirituality. Nasr published several important books from the perspective of the history of Islamic thought and doctrine on cosmology,[48] with a focus on Man and Nature.

Nasr's perspective encouraged many environmental advocacy and conservation activities. Now, religion (theology) is used as the basis for activism. That is because religion can change the hearts and minds of humans, which in turn impacts human behavior.

46. MB Prayitno, "Dampak Perubahan Tataguna Lahan Terhadap Cadangan Karbon Di Lahan Suboptimal". Prosiding Seminar Nasional Lahan Suboptimal 2014, Palembang 26-27 September 2014. www.pur-plso-unsri.org/.../81_%20bambang-bakri_revisi%201.pdf
47. I compare this with the total of highest United States of America transportation emissions which were less than 2 million tons in 2006. See: http://climate.dot.gov/about/transportations- role/overview.html
48. Seyyed Hossein Nasr, 1964, loc.cit.

Human civilization, supported by misused modern technology, exacerbates the climate crisis. It is predicted that the earth will be threatened by increasing temperatures of an average of 2 degrees centigrade by 2050.

Meanwhile, the Intergovernmental Panel on Climate Change (IPCC) stated that a safe temperature increase should be below 1.5 degrees centigrade. However, human lifestyles remain unchanged. Humanity's continued violation of the earth's resources has accelerated the thickening of the atmosphere and will continue to do so, leading to uncontrollable global warming.[49] The lifestyle of modern humans is extravagant, inefficient, and unsustainable. Continued extraction of non-renewable natural resources will deplete natural resources more quickly and create pollution, which will render the accumulation of GHGs emissions in the atmosphere unavoidable.

Scientists predict rising temperatures will cause typhoons, storms and heatwaves to hit the earth's surface with increasing frequency, causing damage on land and sea such as property losses, forest fires, and bleaching of coral reefs in the oceans.[50]

In August 2015, in Istanbul, Turkey, the Islamic Symposium on Climate Change was held to respond to global climate change, giving birth to the Islamic Declaration on Global Climate Change. This declaration is a practical example that illustrates Muslim scholars taking notice of and delivering positive responses to environmental crises. The declaration, initiated by the UK-based Islamic Foundation for Ecology and Environmental Sciences (IFEES), was drafted by six people:

1. Dr. Fazlun Khalid, Founding Director IFEES, UK
2. Prof. Dr. Ibrahim Ozdemier, Ankara University, Turkey
3. Prof. Dr. Datuk Azizan Baharuddin, Deputy Director- General of the Institute of Islamic Understanding, Malaysia

Figure 3.2: Participants at the International Islamic Climate Change Symposium in Istanbul, 15-18 August 2015. This meeting resulted in an Islamic Declaration on Global Climate Change and was attended by scholars and academics from the Islamic world (Source: Fachruddin M. Mangunjaya/PPI UNAS).

49. See, Fachruddin Mangunjaya, *Bertahan di Bumi: Gaya Hidup Menghadapi Perubahan Iklim*. (Jakarta: Yayasan Obor Indonesia, 2008).
50. Stephen Leahy. "Climate change impacts worse than expected, global report warns". https://www.nationalgeographic.com/environment/2018/10/ipcc-report-climate-change- impacts-forests-emissions/ accessed on October 8, 2019

4. Dr. Abdel Majid Tribak, Islamic Economy Social and Cultural Organization (ISESCO), Morocco
5. Mr. Othman A. Llewellyn, Environmental Planner, Kingdom of Saudi Arabia
6. Dr. Fachruddin M Mangunjaya, Deputy Chairman of the Center for Islamic Studies, Universitas Nasional, Indonesia

The symposium was attended by approximately 100 leaders of the Islamic world (scientists, scholars, and Muslim figures). Also present was Halldór Thorgeirsson, Director for Strategy of the UN Climate Change Secretariat. The declaration is substantially expected to mobilize Muslims worldwide to be willing to alter their lifestyles in order to slow down the pace of warming and reduce climate change (mitigation). The declaration will also be beneficial as a guide for climate education, especially in the Muslim world.[51]

In addition, the declaration was officially submitted to the United Nations Framework Convention on Climate Change (UNFCCC). The objective of the UNFCCC is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[52] The Islamic leaders who attended the symposium also called upon all countries to phase out greenhouse gas emissions as soon as possible in order to stabilize greenhouse gas concentrations in the atmosphere. These countries were also invited to commit to fully renewable energy and/or zero-emissions strategies.[53]

As stated in the declaration, it is essential to maintain the perfect equilibrium/ balance (*mizan*) of the earth, which has been disturbed by human activities. Therefore, the important views of the declaration are:

- Allah created the earth in perfect equilibrium (*mizan*).
- By His immense mercy we have been given fertile land, fresh air, clean water and all the good things on Earth that make our lives here viable and delightful.
- The earth functions in natural seasonal rhythms and cycles.
- Allah's gift to us is a climate in which living beings – including humans – thrive.
- The present climate change catastrophe is a result of human disruption of this balance (QS 55: 7-10).

That is a warning to scientists and to the public, as the inhabitants of the earth, that we should remember the nature of Allah's creation, as stated in the following verse:

> "So set thy purpose (O Muhammad) for religion as a man by nature upright – the nature (framed) of Allah, in which He hath created man. There is no altering (the laws of) Allah's creation. That is the right religion, but most men know not." (QS 30: 30)

Nature as a creation of Allah SWT has limitations and limited carrying capacity.

51. Fachruddin Mangunjaya, "Deklarasi Islam untuk Perubahan Iklim". Republika (15 Agustus 2015) https://republika.co.id/berita/koran/news-update/15/08/31/ntxvoe30-deklarasi-islam- untuk-perubahan-iklim retrieved October 2, 2019.
52. "The United Nations Framework Convention on Climate Change". Retrieved November 15, 2005.
53. https://unfccc.int/news/islamic-declaration-on-climate-change

Nevertheless, the damage that has occurred is due to human action which has harmed and even accelerated the rate of damage. So, substantial efforts to deal with climate change, which has resulted from fossil-fuel consumption and excessive lifestyles, should be made as soon as possible.

The declaration, therefore, proclaimed several important points:[54]

a. Calling upon well-off nations and oil-producing states to:

- Lead the way in phasing out their greenhouse gas emissions as early as possible and no later than the middle of the century.
- Provide generous financial and technical support to the less well- off to achieve a phase-out of greenhouse gases as early as possible.
- Recognize the moral obligation to reduce consumption so that the poor may benefit from what is left of the earth's non-renewable resources.
- Stay within the '2 degree' limit, or, preferably, within the '1.5 degree' limit, bearing in mind that two-thirds of the earth's proven fossil fuel reserves remain in the ground.
- Re-focus concerns from unethical profit at the expense of the environment to efforts to preserve it and improve the conditions of the world's poor.
- Invest in the creation of a green economy.

b. Calling upon the people of all nations and their leaders to:

- Aim to phase out greenhouse gas emissions as soon as possible in order to stabilize greenhouse gas concentrations in the atmosphere.
- Commit to a 100% renewable energy and/or a zero-emissions strategy as early as possible, to mitigate the environmental impact of their activities.
- Invest in decentralized renewable energy, which is the best way to reduce poverty and achieve sustainable development.
- Realize that it is not viable to seek unlimited economic growth on a planet that is finite and already overloaded.
- Set in motion a fresh model of wellbeing, based on an alternative to the current financial model, which depletes resources, degrades the environment, and deepens inequality.
- Prioritize adaptation efforts with appropriate support to vulnerable countries with the least capacity to adapt to the ongoing impacts of climate change.

54. It is quoted from *Islamic Declaration on Global Climate Change*, with the permission of the Formulating Team. The Declaration has been translated into 11 languages, including Bahasa Indonesia. Available at :http://www.ifees.org.uk/declaration/.

c. Calling upon corporations, financial institutions, and the business sector to:

- Shoulder the consequences of their profit-making activities and take a visibly more active role in reducing their carbon footprint and other forms of impact upon the natural environment.
- Commit to a 100% renewable energy and/or a zero-emissions strategy as early as possible and shift investments into renewable energy, in order to mitigate the environmental impact of their activities.
- Shift away from the current business model, which is based on an unsustainable escalating economy, and adopt a circular economy that is wholly sustainable.
- Pay more heed to social and ecological responsibilities, particularly to the extent of the extraction and utilization of scarce resources.
- Assist in divestment from the fossil fuel-driven economy and in the scaling up of renewable energy and other ecological alternatives.[55]

Conclusion

Islam does not see a dichotomy between science and religion. The Qur'an teaches that, in addition to the words of Allah SWT textually listed in the holy book, the Qur'an, there are also actual verses in the universe. Therefore, Muslims should understand the two contexts of the verses, qauliyah (written) and kauniyah (exist in nature). Regarding environmental principles, Islam provides a guide and an answer to the concept of His creation and how humans should live and organize it. This chapter has stated that humans are commanded to carry out a mandate. This means that the other creatures He created do not have the ability to carry out such a task.

Humans who study nature and its elements are searching for Allah's secrets. These can be seen as formulas communicated in human language and discovered through natural science. Finding formulas and theories and solving riddles about nature is equivalent to deciphering *sunatullah*. However, human knowledge has limitations because our senses are limited. Humans therefore require tools to aid their understanding.

An interesting aspect discussed in the study of Islam and ecology is the revelation that emphasizes the importance of maintaining balance and which guides human behavior such that it maintains the sustainability of life and humanity. An understanding of *sunatullah* (Allah's decree) in one material or element is needed to understand the extent to which balance can be maintained. Therefore, it is essential to study and understand Allah's Kauniyah verses.

55. *Ibid*.

Humans are mandated to balance science, calculate it, manage it well, and use it in a suitable and measurable method. To prevent mismanagement, humans should predict all aspects of ecology, which is a precise science generating dynamic reactions. However, the scientific approach sometimes encounters many challenges, as human knowledge cannot fully comprehend ecology. Humans must therefore apply the principles of prudence and *tawakkul* to surrender to Allah SWT, so that they may overcome those challenges. The best efforts to understand ecology are based on human knowledge, not desire. Accordingly, scientists formulate the instructions of the Qur'an in the current context, for example, the Islamic Declaration on Global Climate Change as a contemporary description of the Islamic perspective on halting climate change.

Humans are commanded to conduct ecological management carefully, based on science, and to utilize existing natural resources in moderation. In conclusion, with all the availability of natural resources on earth, naturally and based on *Fitrah*, humans will find the greatness of Allah and discover spirituality, sufficiency, and prosperity, as well as the meaning of the beauty of all His creations.

Chapter 4
Climate Crisis in the Islamic World

Recite in the name of your Lord Who created
(Al-Alaq (96):1)

Introduction

Muslim scholars who were engaged in combatting and tackling climate change worldwide initiated the Islamic Declaration on Global Climate Change.[1] However, not many activists are concerned or motivated to discover how Islam responds to environmental issues and climate change challenges. Whereas Islamic countries or Muslim majority countries, such as Indonesia, Pakistan, Bangladesh, Mauritania, Maldives, Senegal, and Middle Eastern countries, including Syria, Egypt, Jordan, are also affected by climate change.

The Islamic Declaration on Global Climate Change is a call and a reminder to whole the world, not only the Islamic world. The Declaration refers to the instructions of the Qur'an, of Allah SWT as the Creator and the Highest Ruler who created with the purpose and truth of bi'l-haqq. Allah is al-Muhit, engulfing His creation. Moreover, through His creation, Allah SWT establishes everything in balance (*mizan)*. Humans must not disturb that balance. Hence, humans should return to *Fitrah* and ponder the purpose of the creation of humanity.

Middle Eastern states are oil-producing countries that encounter a dilemma in combating climate change. Actions which must be taken to prevent climate change include reducing fossil fuel energy sources or non-renewable dirty energy production and extraction. Muslim countries which are oil-producing are cautious about handling this dilemma.

Buchignani et al[2] state that the Middle East and North Africa are projected to experience significant warming in the 21st century. Warming will occur in conjunction with a decrease in rainfall, especially in the West. It will also be marked by extreme weather events.

1. See attachment 2.
2. Buchignani, et al., "Climate change projections for the Middle-East North Africa domain with COSMO CLM at different spatial resolutions," *Advances in Climate Change Researc*h, Volume 9, Issue I, 2018, pp66-80, https://doi.org/10.1016/j.accre. 2018. 01.004

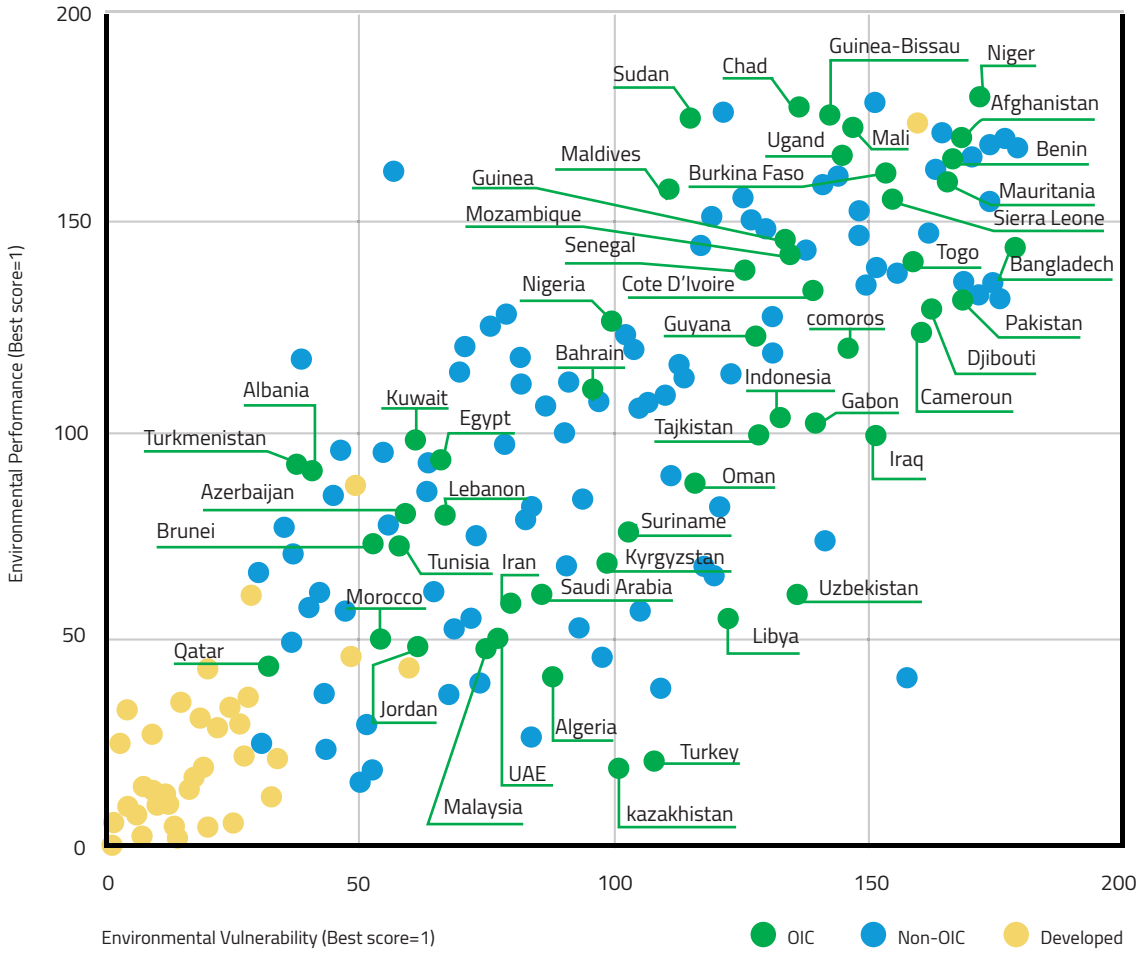


Figure 4.1: Environmental Performance in the OIC countries (ISERIC 2019)

Tolba & Saab's survey report, compiled by the Arab Forum for Environment and Development (AFED), points to an increase in awareness among Arabs on climate change. 98 percent believe the climate is changing and 89 percent believe human activities are the cause. Furthermore, 51 percent of Arabs consider that their government does not act adequately to address the problem, while 84 percent believe that climate change is a severe challenge for their country. In addition, more than 94 percent believe their country would benefit from participating in global action to deal with climate change. 93 percent of Arabs pledged to join in a private action to reduce the problem.[3]

Access to water is a significant challenge in the Middle East because water resources have been greatly reduced. All the Arab countries are predicted to experience severe water scarcity by 2025. The Fertile Crescent regions, such as Iraq, Syria, Lebanon, Jordan, and Palestine, will lose soil fertility perhaps before the end of the century due to decreasing water supply. In addition to increasingly wasteful water consumption by international standards, the extensive construction of dams and unsustainable irrigation practices allegedly contribute to water waste. Climate change has aggravated this situation. Temperature increase will also cause the water flow of the Euphrates River to be reduced by up to 30 percent and the flow of the Jordan River to be reduced by 80 percent before the next century.[4]

3. Mostafa K. Tolba & Najib W. Saab. "Arab Environment: Climate Change. Impact of Climate Change on Arab Countries." Report of the Arab Forum For Environment and Development. Available at: http://www.afedonline.org/afedreport09/Full%20English%20Report.pdf (accessed 16 June 2020).
4. *Ibid*.

Climate change affects water resources, air temperature, sea level, human health, food production, biodiversity and tourism. CERIC record (2019) noted that most OIC member countries have poor environmental performance and high levels of vulnerability to climate change (see Figure 4.1). By observing the overall position of OIC members based on Environmental Performance Index (EPI) rankings and climate change vulnerability rankings, Qatar is the best- performing and most environmentally friendly country, followed by Turkmenistan, Albania, and Brunei. However, 24 OIC member countries are ranked among the most vulnerable and lowest in the world. Bangladesh is at the bottom with an EPI score of 179, followed by Niger, Pakistan, and Afghanistan. In general, these countries lag far behind in environmental conservation, planning and governance.[5]

Climate Crisis in the Islamic World

OIC member countries are minor polluters, but their Green House Gas (GHG) emissions are rising in conjunction with limited mitigation efforts. During 2000-2017, 38 out of 54 OIC countries with recorded data witnessed an increase in CO2 emissions per capita. Saudi Arabia recorded the highest growth of 6.7 metric tons per capita in CO2 emission, followed by Kazakhstan (5.9 metric tons), Oman (5.8 metric tons), Turkmenistan (3.9 metric tons), and Iran (3.0 metric tons). Conversely, Qatar recorded the highest decline (16.5 metric tons per capita) in CO2 emissions, followed by the United Arab Emirates (6.4 metric tons), Kuwait (3.3 metric tons), and Bahrain (2.8 metric tons). Per capita emissions remained comparatively high in oil exporting states such as Qatar, Bahrain, Kuwait, United Arab Emirates, and Saudi Arabia. Meanwhile, CO2 emissions stayed well below half a metric ton (0.5) per capita in 16 member countries, most from Sub-Saharan Africa.[6]

One damaged ecosystem in the OIC region is the Aral Sea, in the Kazakhstan and Uzbekistan regions. IUCN categorized this area as an ecosystem collapse which must urgently be restored. The Aral sea ecosystems have lost important natural environmental features and have been replaced by species derived from different ecosystems.[7]

Many plant and animal species in Arab countries face extinction and are increasingly vulnerable to climate change. According to global standards, numbers of species in the Arab world were already low, and the intensive dry climate makes the region vulnerable to significant loss of species. Based on the IUCN Red List of Threatened Species, Yemen has the highest number of threatened plant species, at 159, while Sudan and Somalia have 17 threatened plant species. Djibouti, Egypt, Jordan, Morocco, Saudi Arabia, Somalia, Sudan, and Yemen have more than 80 threatened animal species. Egypt tops the list with 108 threatened species. Climate change has altered the animal composition of entire ecosystems.[8]

5. Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC). *OIC Environment Report 2019* (Ankara, Turky: IOC, 2019) p 49-50.
6. *Ibid*., p. 51
7. *Ibid*., p 4
8. MK Tolba & NW Saab, "Arab Environment: Climate Change, Impact of Climate Change on Arab Countries. Report of the Arab Forum for Environment and Development". Available at: http://www.afedonline.org/afedreport09/Full%20English%20Report.pdf (Retrieved June 16, 2020).

South Asia - Bangladesh

Bangladesh has a population of 165 million, one-third of which lives along the southern coast. Communities raise livestock and manage fish ponds, which are supported by the installation of pond dikes. During the rainy season, more than a fifth of the country is flooded.[9]

According to National Geographic, throughout the last decade approximately 700,000 Bangladeshis per year have been displaced due to natural disasters. That number has increased due to catastrophic cyclones, such as Cyclone Aila in 2009 which killed more than 200 people and displaced millions.

The climate crisis in Bangladesh has contributed to rising sea levels, erosion, salinity intrusion, crop failure, and tidal flooding. The coastal inundation has rendered the area no longer inhabitable.[10]

Scientists envision that climate change will soon cause Bangladesh's mainland to be inundated with flooding and erosion. The four main causes are:

- Over the next few decades, Bangladesh will experience 10 to 20 percent more rainfall than usual.
- The silt-heavy runoff from glaciers in the Himalayas Mountains leads to increased erosion.
- Rising sea levels will cause flooding and slow water flows on land.
- Higher temperatures make cyclonic storms more extreme, with stronger winds and heavier rain.

A sea-level rise of 100 cm will reduce Bangladesh's land surface area by 20 percent. That reduction will force 15 million residents to relocate. However, the number of Bangladeshis who will be affected is far greater than the 46 million people living in flood-prone areas. The number of individuals affected could reach 118 million.

Floods and landslides are part of Bangladeshis' lives. Land renewal is critical, but high-intensity and frequent disasters hinder such efforts. For example, flooding in 2004 killed 800 people and displaced 30 million. Around 18,000 elementary schools were forced to close and 80 percent of the secondary crops were destroyed.

Moreover, rising sea levels have polluted groundwater, threatening the usage of wells, which is widespread. Such impacts occur in Bangladesh and in lower regions such as Indonesia and the Philippines.

9. Tim McDonnel. 2019. "Climate change creates a new migration crisis for Bangladesh." National Geographic. https://www.nationalgeographic.com/environment/2019/01/climate- change-drives-migration-crisis-in-bangladesh-from-dhaka-sundabans/
10. *Ibid*.

Pakistan

Pakistan has contributed less than 1 percent of the world's greenhouse gas emissions, but its 200 million people, primarily Muslim, are among the most vulnerable to advancing climate change.

The Asia Development Bank (ADB) reported that climate change in Pakistan has the potential to affect environmental and social determinants of health such as safe drinking water, clean air, adequate food, and safe housing. In the last decade, Pakistan has experienced extreme heat, natural disasters, and irregular rainfall.[11]

Heatwaves are projected to increase in frequency and duration. The 2015 Karachi heatwave killed more than 1,200 people in Pakistan and around 200 people in Sindh Province, India.

In Karachi, a maximum temperature of 44.8°C was recorded as the second-highest temperature after 1979. In Pakistan, heat waves are common around May-June. Temperatures across Pakistan are predicted to increase by 3°C within the next 20 years and by around 5-6°C by the end of this century. The country will be victim to tumultuous weather cycles, endangered food production, rising sea levels, abnormal precipitation, catastrophic flooding, and depletion of ice sheets and glaciers which are the core source of sustenance in an agricultural land such as Pakistan.[12]

The Maldives

At a Climate Change Conference in Copenhagen (COP 15), the President of the Maldives, Mohamed Nasheed, was famed for delivering a statement that he had an underwater cabinet meeting somewhere in the Maldives. The Maldives is continuously in danger of being submerged, given that it is only 1-2.4 meters above sea level. The Maldives enforces Islamic law because it was inherited by its founder from the Islamic sultanate.

The Maldives is an attractive tourist destination for its white sands and atolls lined with palm trees. Unfortunately, this beautiful country is endangered by rising sea levels due to climate change. The Maldives government has struggled to build crucial infrastructure such as sea walls.

At a UN climate forum in Madrid in December 2019, the Maldives and other vulnerable countries failed to obtain new funding to cope with long-term disasters and damage due to climate change.[13]

11. Chaudhry, QUZ. "Profil of Climate Change of Pakistan". ADB: Manila, 2017. DOI: http:// dx.doi.org/10.22617/TCS178761 p 3
12. Khahayam Munawar. "Understanding Climate Change in Pakistan". *The Nation*. 14 Dec 2019. https://nation.com.pk/14-Dec-2019/understanding-climate-change-in-pakistan
13. https://www.reuters.com/a-++rticle/us-climate-change-maldives/we-cant-wait-maldives- desperate-for-funds-as-islands-risk-going-under-idUSKBN1ZG0XS

Climate change threatens the very existence of the Maldives. According to the World Bank, it is projected that by 2100, sea levels will have risen between 10 and 100 centimeters, so that the entire country will be submerged. Most Maldivians live on small, flat, densely populated coral islands (atolls) that are threatened by violent storms at the slightest rise in sea level. The capital of the Maldives, Malé, is in danger of sinking because it is on a small, flat, very densely populated atoll. We can imagine how worried the mostly Muslim population is (See Figure 4.2).

Sahel

Sahel in Arabic literally means beach. The region, which has a semi-arid climate, stretches across the south-central latitudes of North Africa between the Atlantic Ocean and the Red Sea. From west to east, the Sahel region of Africa consists of ten countries, with a population of 300 million. These include Senegal, Mauritania, Mali, Burkina Faso, Algeria, Niger, Northern Nigeria, Northern Cameroon, Central African Republic, Chad, and central and southern Sudan. In 2018, around 5 million people were displaced. That number increased threefold over the few following years. Furthermore, 24 million people require humanitarian assistance. According to the United Nations, this region is the most affected, with a projected temperature rise of 1.5 times the global average.

Figure 4.2: The Maldives is a Small Island Country in the Pacific, with 400 thousand inhabitants. The altitude of this area is only 1 – 2.4 meters above sea level; it is located in the Pacific Ocean. If sea levels rise, the very existence of this archipelagic country will be at risk (Source: Wikipedia).

> "It is regularly hit by droughts and floods which have enormous consequences on people's ability to earn a living and feed their families. Many young people commit acts of terrorism, not because of their religious beliefs but a lack of job opportunities or unemployment."[14]

14. https://www.climatecentre.org/news/1066/un-sahel-region-one-of-the-most-vulnerable-to- climate-change

Mauritania, Senegal, and Chad

While some countries enjoy an abundance of water, others experience droughts. A United Nations report indicates that rainfall in the Western Sahel (Mauritania and Senegal) is projected to decline by more than 20 percent during the summer and winter. Such a decline will result in crop failure. Rainfall has decreased drastically in Senegal, and in 2020 agricultural production was reduced by more than 50 percent. This region has arid land below the Sahara Desert that stretches from Senegal to Chad. Although it only accounts for 3 percent of greenhouse gas emissions compared to those of the United States, according to UN climate data temperatures in this area increase 1.5 times faster than the global average.

The Sahel is experiencing extreme temperatures, fluctuating rainfall, and droughts, all of which can degrade land, change grazing patterns, and reduce water supply for both animals and people. This in turn jeopardizes food security, but also revenue from exports. Peanuts are a source of income for Senegal. However, as Thierry Lebel of the Senegal Institute for Development and Research pointed out, groundnut production in Nigeria has been almost non-existent. An already weak economy has gotten weaker.[15]

South Asia

Central Asian countries have around 70 to 86 percent Muslim population. These countries are Tajikistan (96.7 percent), Turkmenistan (89 percent), Uzbekistan (88 percent), Kyrgyzstan (87.6 percent), and Kazakhstan (70.6 percent). Each has been affected by climate change. Average summer rainfall in parts of Pakistan, Iran, and Central Asian countries such as Uzbekistan and Tajikistan could decline by more than 20 percent over the next few decades.

Figure 4.3: Melting glacier ice around the Kumtor gold mine, south of Lake Issyk Kul, Kyrgyzstan (Source: © Travel Land Kyrgystan).

15. https://qz.com/africa/1719442/west-africas-sahel-vulnerable-to-climate-change-bad- governance/

In addition to an intense reduction in rainfall, Central Asian countries such as Tajikistan and Kazakhstan are highly dependent on water from melting glacier ice sheets for their supply of clean water. In Kazakhstan, glaciers have shrunk by more than 25 percent over the past 50 years.

Along with impacting long-term clean water supply, melting glaciers caused flash floods in April 2016. As a result, landslides washed away water pipes in the Roghun district of Tajikistan, leaving tens of thousands of people without water supply for three days.

Celestial Mountains, located in Central Asia bordering China, retain gold mines, water, and glaciers. These mountains extend about 2,400 km and mainly straddle the border between China, Kyrgyzstan, and Kazakhstan. The mountain peaks of this region, which are nearly 7,000 meters high, contain glaciers which are critical sources of water for Central Asia. In addition, Tien Shan Gold Mine, one of the largest open-pit gold mines in the world, is located in Kumtor, Kyrgyzstan.

This controversial goldmine project accounted for nearly 8 percent of Kyrgyzstan's economy in 2013. However, it also poses a significant threat to glaciers and to the water supply for those living downstream in Kyrgyzstan and in neighboring countries. The mine's main gold deposit lies beneath several glaciers in Issyk Kul Province, 325 km to the southeast of the capital Bishkek and adjacent to the state wilderness reserve.[16]

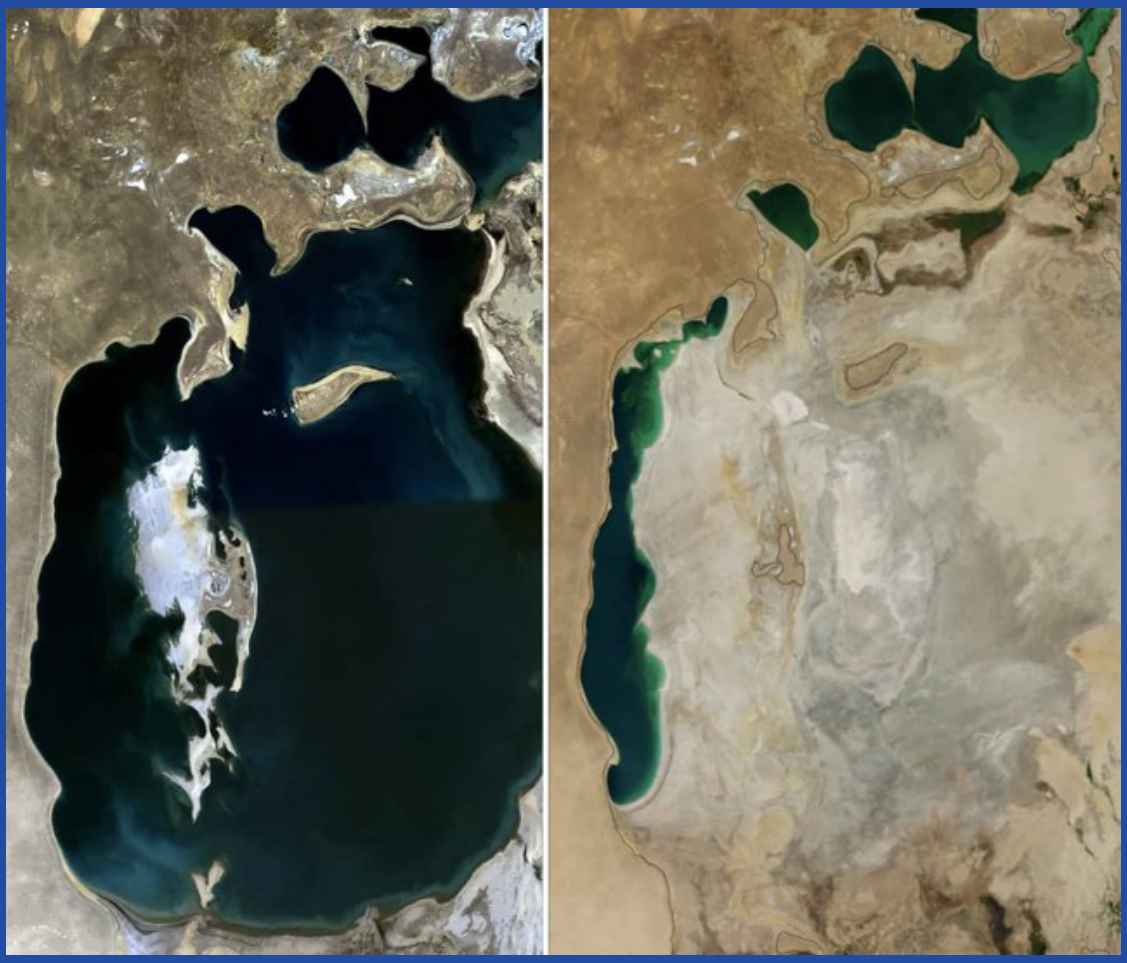
One of the critical areas affected by climate change is the Aral Sea in Kazakhstan. This area was once a prosperous sea with various fresh marine fish, whose seawater fed dams and vast expanses of agriculture. Due to climate change, the 87 sq. km Sea has become a desert.

Based on research carried out at Columbia University,[17] before the drought, the Aral Sea was a climate regulator in Central Asia. The sea, which is as wide as the city of Banjarmasin, plays a role in suppressing the wind that blows from Siberia, which is known to be strong in winter and which also cools the Kyrgyz region if it occurs in summer. Global warming has led to a crisis in the Aral Sea. It has been recorded that between 1960 and 2000, the average monthly air temperature above and around the sea increased from 2°C to 6°C in the Summer. 50-60 percent of the sea area disappeared due to high evaporation. The air temperature also decreased during winter. The IUCN categorizes the Aral marine ecosystem as collapsed (destroyed) and not restorable to its original state.

16. https://glacierhub.org/2014/12/23/kumtor-gold-mine-threatens-central-asian-glaciers-and- water/
17. http://www.columbia.edu/~tmt2120/introduction.htm

Box 4.1

The death of the Aral Sea



Aral Sea in 1989 **Aral Sea in 2014**

The Aral Sea is located between Uzbekistan and Kazakhstan. The Aral Sea covers an area of 68 thousand square kilometers, or twice the area of Central Jakarta. In the 1960s, it was the fourth largest sea in the world. Now, it is like a lake. Moynaq City, the nearest town, was an important town for fishermen. In the past, this sea supplied fish year-round.

The Aral Sea provided a fresh water supply for northern Uzbekistan and southern Kazakhstan. Forty years later, this region experienced an unexpected disaster that transformed the sea into a desert (Source: NASA Earth Observatory).

The study also noted that it became challenging to measure precise fluctuations in temperature increase due to the Aral Sea crisis because the entire Central Asian region had experienced an increase in air temperature which inevitably resulted in drying up the Aral Sea (See Box 4.1: Death of the Aral Sea).

Middle East

In recent years, extraordinary events in Middle Eastern countries have occurred. Mecca, in Saudi Arabia, is a holy place, the qibla of worship for Muslims. Massive sand and dust storms, followed by hurricanes and rain, hit Saudi Arabia. The unexpected catastrophe was a shock to the inhabitants of the desert.

During the September 2015 hajj season, high levels of wind swept across the holy city of Mecca when millions of Muslims were performing the pilgrimage rites. Extreme winds, the likes of which had never before occurred, knocked down a construction crane that was being used to expand the Grand Mosque. Wind speeds of up to 200 miles per hour caused the crane to fall, killing hundreds of pilgrims. At that time, a significant expansion was underway to increase the mosque's capacity.[18] Such a phenomenon had not happened in the last 30 years, according to a Riyadh resident.

Sand and dust storms in the desert are not new, but the cataclysmic event on September 11, 2015, was different. The winds that scattered the desert sand at a speed of 200 miles per hour, followed by a rainstorm capable of felling cranes and severing steel ropes, are extraordinary phenomena.

Box 4.2

Floods and Snow in the Middle East

8. https://www.bbc.com/news/world-middle-east-34226003

Arabs playing in the snow. An unprecedented event in the last 10 years in the Middle East (Source: http://123surfer. blogspot.com/)

In the last ten years, I have often received messages (through WAG) from Hajj pilgrims in Mecca about the flash floods in Jeddah, storms, and even snowfall.
A 2013 Washington Post reporter stated that it is rare for snow to fall over large parts of the Middle East.

The snow covered Southern Turkey, Syria, Lebanon, Israel, the Palestinian territories, and Egypt. The last time it had snowed in Jerusalem was 50 years previously, while Egypt's capital, Cairo, had not experienced snow for decades.
Snow exacerbates misery for refugees, especially those in the sprawling Syrian refugee camps.[1]

In January 2011, the Saudi ministry of education announced the closure of schools in Riyadh on the Wednesday following heavy rains that hit the capital. The rains persisted for several hours. People stayed in their homes in the capital (Riyadh), the Eastern Province, Tabuk, Assir, and Baha regions. It was reported that snow fell in the northern region of Tabuk on Tuesday, and the highlands of Jabal Allouze and Al-Tafaha near Tabuk were largely covered with snow.

The General Authority of Meteorology and Environment stated that the minimum temperature in Tabuk had fallen below zero degrees Celsius. The heavy rains and fog led to low visibility across different regions, resulting in many traffic accidents. The bad weather also disrupted electric power supply in some areas. The electricity company stated that it had intentionally cut off the power to avoid fatal incidents.[2]
Intense weather, including strong winds and heavy rainfall on 27 October, 2019, caused extreme damage in Hafr Al-Batin in the Eastern Province, Saudi Arabia. Rainstorms in the afternoon dumped 43mm of rain in just 30 minutes. 7 people died in the storm and 11 people were injured. Around 1,100 people were affected.[3]

1. https://www.washingtonpost.com/news/worldviews/wp/2013/12/12/23-photos-of-the- middle-east-blanketed-in-snow/
2. https://gulfnews.com/world/gulf/saudi/schools-closed-following-heavy-rain-snow- in-saudi-arabia-1.748920
3. http://floodlist.com/asia/saudi-arabia-floods-hafralbatin-october-2019

Albugami and Tim's report noted that from 2000 to 2016 the frequency of dust storms increased by 14 percent in the eastern part of Saudi Arabia, especially around al-Ahsa. In addition, there was also an increase in the frequency of dust storms in Jeddah by 3 percent.[19]

Extreme temperatures and strong winds are anomalies caused by climate change. Experts believe that one sign of climate change is the appearance of weather anomalies and extreme phenomena such as unexpected rainstorms, excessive rainfall, and extremely high or very low temperatures.

Hussein Shobokshi[20] noted that Saudi Arabia is currently a country affected by global warming. Disasters resulting from a changing climate have affected health, community behavior, and agricultural patterns.

In recent years, we have often witnessed Saudi Arabia experiencing heavy rains, which has caused casualties. Flooding often occurred because the sewers in the city of Jeddah could not accommodate large overflows of water.

Two years ago, numerous photos of Saudi Arabia published in newspapers and on social media showed a rare image: rainfall in the middle of the desert and snow falling on the peaks of the Al-Taif mountains. That incident clearly warns of an inevitable climate transition in Saudi Arabia (See Box 4.2 Floods and Snow in the Middle East).

Based on these facts, climate change occurs because increasing amounts of greenhouse gas (GHG) emissions accumulate in the atmosphere, disturbing the earth's balance. The concentration of GHG emissions resulting from pollution on earth has reached more than 400 ppm, compared to only 280 ppm in pre-industrial times. Such conditions result in more heat being trapped in the atmosphere, causing temperature increases and bringing about extreme weather in certain parts of the world.

Regrettably, oil, a non-renewable fossil fuel, is a vital cause of the increased emissions. That is because almost 90 percent of the energy used by humans for industry (power-generating machines, driving cars, and other means of transportation) is derived from fossil fuels such as coal and oil.

Arab countries emit more fossil-based carbon emissions than other industrialized countries on a per-capita basis. Emissions per capita in Bahrain are equivalent to 18.1 tons per person, Saudi Arabia's emissions are 18.7 tons per person, Qatar's emissions are 43.9 tons per person, UAE's emissions are 20 tons per person, and Kuwait's emissions are 29.1 per person. In comparison, the USA's emissions per capita are only 17 tons per person. Meanwhile, Indonesia's emissions per capita are 2.3 tons per person.[21] High emissions are directly proportional to a nation's consumption and lifestyle – it is reflective of the wasteful energy expended to support life.

19. Albugami, Sarah, *et al*. "Spatial and temporal variations in the incidence of dust storms in saudi arabia revealed from in situ observations." *Geosciences* 9.4 (2019) p, 162.
20. Husein Shobokshi, "Climate Change in Saudi Arabia". http://english.aawsat.com/2013/05/ article55300746/option-climate-change-in-Saudi-arabia.
21 Per capita numbers in terms of CO2 emissions (metric tons per capita), *World Development Indicator* http://wdi.worldbank.org/table/3.8

The movement to prevent climate change in Middle Eastern countries faces difficulties because that requires downsizing production and consumption. Furthermore, it would also result in lower per capita income and loss of life comforts. Even Saudi Arabia, for example, will increase the production to 12.3 million barrels per day for their customers, thereby increasing 300 thousand barrel per day over the Aramco's maximum sustained capacity. This effort was allegedly able to reduce global CO2 emissions. Middle Eastern countries have taken mitigation (reduction) measures to overcome this global climate crisis.

The climate is changing. Accordingly, it is time for Saudi Arabia and other Middle Eastern countries to understand the indicators of climate change. Extreme weather anomalies have resulted in numerous deaths. Like other countries on this planet, Saudi Arabia is trying to adapt in order to mitigate climate change.

The more than two million Muslims from various nations who gather during the pilgrimage season need to adapt to the current climate. Rising temperatures of up to 45 degrees Celsius require attention and forward-planning. In efforts to anticipate and prepare for climate change phenomena, Saudi Arabian authorities could temporarily stop activities and increase security in the entire Masjid al-Haram.

By becoming aware of climate change indicators, Saudi Arabia, as a desert country, will no longer be surprised by extreme flooding or high temperatures but will rather be able to adapt and anticipate extreme weather.

Political Conflict

Climate change hinders the growth of food crops due to extreme temperatures and inadequate water supply. Climate change is also accompanied by storms and floods that destroy crops. High temperatures and irregular rain patterns encourage various pests and diseases.[22]

What follows is a food crisis. Food is an essential basic need that enables human life, and food shortages cause social problems if not resolved.

As a result, social problems have occurred, such as in Tunisia. Tunisian police confiscated a fruit and vegetable cart owned by Muhammad Bouazizi for no apparent reason. Bouazizi was devastated before he finally set himself on fire.

The incident spread on local social media and sparked protests by the Tunisian people who had been struggling due to the high cost of living and the high unemployment rate. In December 2010, Tunisia was rocked by protests against Zine El Abidine Ben Ali's government. In 2011, the upheaval spread to Egypt, Libya, and Yemen by means of social media. An American political observer called it "The Arab Spring." The people of these countries urged their respective heads of government to step down. Tunisian President Zine El Abidine Ben Ali was deposed a month later, after 23 years in power. He fled to Saudi Arabia.

22. Environmental Protection Agency, "Climate Impacts on Agriculture and Food Supply". https://archive.epa.gov/

The ouster of the Tunisian president inspired anti-government protests in Bahrain, Jordan, Kuwait, Egypt, Yemen, and Libya. In Bahrain, protesters demanded that the government release political prisoners and uphold human rights. In Jordan and Kuwait, parliaments were dissolved at the urging of the masses. In Libya, the repressive actions of Moammar Gaddafi's government against the protesters led to a civil war that ended in his assassination. In Yemen, the popular resistance overthrew President Abdrabbuh Mansur Hadi.

In Tahrir Square, Cairo, Egypt, an 18-day mass protest involving tens of thousands of Egyptians forced President Hosni Mubarak to step down after 30 years in power.

The effects of 'The Arab Spring' have endured across the Middle East, including massive disruptions against repressive government actions, high inflation, and job scarcity.

Extensive research on the upheaval identified another rarely exposed element: the food crisis. Prior to police violence against Muhammad Bouazizi, Tunisians experienced high unemployment (up to 14 percent of working-age people), few job opportunities, and a high cost of living.

The delayed planting season due to extremely high temperatures resulted in food shortages, while demand increased. A similar situation also occurred in Algeria. Workers and students took to the streets to protest rising food prices. They attacked banks, police stations, and government offices. Jordanians also protested against rising food prices and demanded that the Prime Minister step down.

Although some groups warned of the impending food crisis in the region, governments did not implement effective strategies to counter this risk. The situation in Tunisia, Jordan, Egypt, Yemen, Libya, Algeria, and Sudan paints an accurate picture of the world's food crisis: an imbalance of consumption and production. As consumption increases due to population growth; production decreases due to disappearing agricultural lands. Water is becoming scarcer, and planting schedules are delayed due to the changing climate.

Prof. Nouriel Roubini, from New York University, stated that the rising commodity prices in international markets have exacerbated the food crisis in the Middle East. That was then further exacerbated by price speculation. Roubini highlighted that the principal source of the food crisis is climate change, but that it is exacerbated by price speculation.[23]

Roubini's conclusion is supported by Collin P. Kelly et al, who studied Syrian farmers. Severe drought and extreme temperatures have forced farmers to abandon their fields and migrate to cities. That further complicated a civil war that killed hundreds of thousands of people.[24]

Kelly's research examines in detail the way climate change contributes to political turmoil. This conclusion does not dismiss other contributing factors such as corrupt leadership, injustice, uncontrolled population growth, and the government's inability to deal with its citizens' suffering.

23. Danny Schechter, "The hidden roots of Egypt's despair". Aljazeera.com, Ja 31n, 2011.
24. Colin P. Kelley and friends. *Climate change in the Fertile Crescent and implications of the recent Syrian drought.* Proceedings of the National Academy of Sciences, March 2, 2015

Egypt

Egypt reformed its agricultural model in 1987 to increase its food production. The harvest season was stable; food prices benefited farmers, and the climate was advantageous. Economic policies supported agricultural development, encouraging farmers to invest in modern agriculture.

However, between 2004 and 2013, wheat and grain production decreased from 8.8 million tons to 8.5 million tons. This yield is not sufficient to meet domestic needs, which amounts to around 20 tons per year. The leading cause of this reduction is limited agricultural land and water. Other factors include the high price of seeds, pesticides, and fertilizers. Fluctuations in commodity prices reduce farmers' interest in investing in agricultural technology and other production methods. As a result, Egypt experienced a food shortage and was forced to import more wheat from year to year. Egypt is thus increasingly dependent on wheat imports. In 2009, Egypt imported 54 percent of its grain supply from Ukraine, France, and Romania (Egypt's leading suppliers).

The more dependent Egypt is on food imports, the more vulnerable it is to rising world food prices. In 2009, the Egyptian people began to experience economic hardship. Hosni Mubarak's repressive system of government managed to temporarily suppress the resulting protests. However, the burdens caused by economic hardship only worsened, meaning that the government's repressive actions simply delayed the onset of the revolution. Moreover, the repressive regime served to unite the anti-government forces.

Before the riots, Egypt's wheat subsidies amounted to three percent of the country's Gross Domestic Product (GDP). When wheat imports declined and the supply of wheat decreased, the price of wheat triggered soaring bread prices. Because the Egyptian people knew that wheat was subsidized, they blamed the government for the high price of wheat and its derivatives. Disappointment turned into anger: that added to the people's existing burdens such as job scarcity and low wages. Those previously uninterested in politics became eager to revolt.

Syria

The National Oceanic and Atmospheric Administration (NOAA) of the United States found that climate change due to increased greenhouse gases resulted in drought during 2010. At that time, the World Bank stated that Syria was relatively safe because the country's wheat production was sufficient. However, the country was hit by food insecurity after the drought caused 75 percent of crops to fail. At that time, Syria began to depend on imports.

On the other hand, the government of Bashar al-Assad was more interested in building power and wealth for a group of elites. Social and economic life was relatively static. The definition of 'Modernization' for Assad was new cars, the latest cell phones, luxury restaurants, and hotels for wealthy urban communities. Attention was not paid to infrastructure, schools, and social services for the poor.

Prior to the riots, agricultural land in Syria experienced severe drought. Ineffective agriculture and environmental policies, coupled with severe drought, led Syria into political unrest.

Impoverished farmers were forced to abandon their land due to the severe drought and the government's failure to invest in agriculture. Caitlin Werrell and Francesco Femia of the Center for Climate and Security in Washington, D.C. stated that the prolonged drought from 2006 to 2010 led to widespread resistance against the government. Crop failure prompted farmers to leave their lands in despair, leading to discontent with the government.[25]

The resistance groups therefore made food their main battlefield. The government closed routes for food aid deliveries to resistance groups. UN food aid was also blocked at the Yarmuk refugee camp in Damascus, causing the refugees to starve. In addition, government forces bombed bakeries in resistance areas.
The prolonged drought in Syria, 2006 to 2010 was the worst period and resulted in widespread crop failure.

During that time, the Syrian rural population migrated to the cities. According to the Climate Signals, climate change was a significant factor leading to unrest in Syria.[26]

Arab countries are the largest importers of wheat and grains globally. They depend on North American, European and Central Asian exports. Therefore, if there is a disruption in the supply of wheat and grains to the Middle East region, socio-political stability will also be disrupted. Drought is one of the main factors disrupting the food supply. On the other hand, food deficiencies are often caused by mismanagement rather than food shortages.

Other factors contribute to instability, such as corruption and cronyism that ignores the welfare of the rural population. Droughts did not lead to civil wars and political unrest in countries with good leadership.

Foreign interests have also played a role in the Middle East region's chaotic political, economic, and environmental chaos. Each Middle Eastern country has relationships with Western countries. It is essential to examine these relationships in terms of their interests. The United States and Russia, for example, provide financial support to government regimes in the region because of their economic and political interests.

25. Thanassis Cambanis. "The Arab Spring was a revolution of the hungry". *Globe Correspondent*, August 23, 2015.z
26. https://www.climatesignals.org/events/syrian-drought-2007-2010

Tunisia

Tunisia also experienced rising food prices. The Tunisian president at the time, Zine El Abidine Ben Ali, promised to lower the price of basic goods, such as wheat, milk, and sugar, but he failed to do so. He stepped down in January 2011.

Tunisia depends on other countries for grain and wheat. A 2011 FAO report stated that Tunisia imported about 2 million tons of wheat and grain between 2010 and 2011. The increase in international wheat prices was not followed by domestic price adjustment; the government made no attempt to control and lower the price of basic necessities. As a result, widespread protests sprung up throughout Tunisia. Ben Ali attempted to quell the protests by allocating subsidies for basic necessities. However, he took action too late and was unable to contain the protests.

The middle class and labor groups, which are the majority in Tunisia, led the country's transformation. The extensive middle class was the result of a well-run education system, and the working class resulted from good social organization. Thus, the transition of power in Tunisia was achieved without bloodshed and chaos. The large middle class also allowed for strong political and economic stability, making it impossible for incompetent leaders to stay in power long.

Interestingly, although Tunisia was the trigger country for The Arab Spring, it can be defined as the most successful transition of power and political reform in the Middle East.

Libya

The case of Libya contrasts that of Tunisia. Libya's militaristic system of government led by Moammar Gaddafi prohibited the growth of the middle class. Gaddafi forbade the private sector from controlling trade and the economy, silenced the press, and controlled public and military services. Under this system of government, the people of Libya had limited access to economic resources.

As a result, Libya had insufficient infrastructure. The water crisis at the time worsened this situation. Climate forecasts stated that drought in Libya would increase drastically every year, potentially triggering a food crisis.

In an attempt to combat the water crisis, Gaddafi decided to take the profits from Libyan oil to finance a river construction project spanning Egypt, Chad, and Sudan.

However, such efforts to overcome food shortages were too late, and an armed rebellion broke out. Why did Libya experience a civil war that led to the overthrow of the government? Its situation was different from Tunisia's, whose government transition was smooth. The answer lies in the difference between the two regimes. On the one hand, the Tunisian government is more structured and operates based on the institutions that support it, with a solid middle class base. On the other hand, Libya is a centralized power system that aims to control people's lives. So, when a government system fails to handle urgent matters, the entire system collapses.

Like other Arab countries, Libya is also dependent on food imports. It has little agricultural land, which is inadequate to produce enough food to meet the people's needs. Libya imports 80 percent of its food. Wheat is the most prominent imported commodity.

In 2008, according to the United States Department of Agriculture, Libya imported 1,574 megatons of food. Leading up to 'The Arab Spring,' in 2009-2010, imports increased drastically to 2,091 megatons. This dramatic increase in food imports coincided with an increase in commodity prices. Thus, Libya spent more money on fewer goods. Meanwhile, domestic food production declined due to climate change, which resulted in long-delayed planting season and crop failures.

The bloody unrest in Libya was due to various factors, most notably those outlined above. High food prices encouraged the Libyan people to take to the streets, joining opposition groups, to topple the government.

Jordan

The impact of The Arab Spring in Jordan was slow. The government managed to calm the protesters and avoid a total collapse. The Kingdom of Jordan learned from an event that occurred in 1989, when the Jordanians took to the streets to protest the rise in the prices of basic goods. To quell the upheaval, King Abdullah II opened a dialogue and struck a compromise with the protesters.

King Abdullah II is a descendant of the Jordanian royal family. The family has done much for Jordan and has built good relations with the United States and other Western countries. He is accorded legitimacy due to his family's high status and his position as the 27th descendant of the Prophet Muhammad. Hence, Jordanians blamed the Prime Minister and government officials for the food crisis and social unrest. They demanded the Prime Minister to step down; King Abdullah II was safe from being overthrown.

The increase in food prices in Jordan was partly the result of upheaval caused by 'The Arab Spring.' To overcome this crisis, King Abdullah II established the National Dialogue Committee consisting of 52 political and community leaders. The king also formed a royal committee to amend laws in order to bring about political reforms.

The Arab Spring led to political reforms in Jordan rather than the overthrow of the government. Hence, Jordan remained stable. That outcome was encouraging to the rest of the world, because Jordan is an essential ally of the United States in the region.

These events across the Middle East are an essential indication that the key to building nations' sustainability and resilience are efforts to maintain climate stability, strong leadership institutions, justice, and transparency.

The climate crisis will lead to disasters because rising temperatures trigger waves of displacement and wars due to scarcity of resources, especially water scarcity.[27] National Geographic launched a comprehensive study which concluded that wars and killings increase with global warming.[28] A study found that wars, killings, and other acts of violence will occur more frequently in the coming decades as a direct result of global warming.

27. Craig Welch. "Climate Change Helped Spark Syrian War". https://www.nationalgeograph- ic.com/2, March 2015.
28. Ker Than, "Wars, Murders to Rise Due to Global Warming?" https://www.nationalgeo- graphic.com/ August 1, 2013

Indonesian Challenge

Indonesia has the largest Muslim population in the world. It is at the top of the list of countries that have joined the OIC since its establishment in 1969 (Appendix 1). Indonesia is the largest archipelagic country in the world, with the number of officially recorded islands reaching 16,056. Hence, it has high biological diversity compared to other Muslim countries. The United Nations Conference on the Standardization of Geographical Names (UNCSGN) and the United Nations Group of Experts on Geographical Names (UNGEGN) forums on 7-18 August 2017 in New York, United States, confirmed the official number of the Indonesian islands.[29]

Box 4.3

Will Jakarta be Submerged?

A giant dam was built in Pluit, North Jakarta, to protect Jakarta from tidal (rob) flooding when the rain comes (Source: ©Fachruddin Mangunjaya)

BAPPENAS (2010) conducted a scientific study entitled Scientific Basis: Analysis and Projection of Sea Level Rise and Extreme Weather Events. The study noted that Jakarta will be mildly submerged in 2050 and be severely submerged in 2100. Overall, the average sea level is projected to rise by 22.5 cm ± 1.5 cm in 2030 relative to the sea level in 2000. By 2050, the cumulative rise is expected to range from 35 cm to 40 cm. The sea level is projected to reach 60 cm ± 4 cm in 2080 and 75 cm ± 5 cm in 2100.[1]

1 Bappenas, "Indonesia Climate Change Sectoral Roadmap - ICCSR Scientific basis: Analysis and Projection of Sea Level Rise and Extreme Weather Events. Jakarta: Bappenas", 2010. Available at: https://www.bappenas.go.id/files/2013/5229/9917/ analysis-and-projection-of-sea-level-rise-and-extreme-weather201102171302241.pdf (June 30, 2020)

Is it true that Jakarta will gradually be submerged? The signs are now visible. Head to the North Coast of Jakarta and you will find that some of the piers are now surrounded by a giant wall. In Cilincing, located on the northeastern outskirts of the city and consisting of scattered fishing communities and an industrial port, five meter-high concrete pillars line the shoreline. This giant wall is an embankment to hold the rob entering during the high tide. If you are around Mangga Besar when the water is high, the water will overflow and remain for a long time.[2]

The government has built a 9.3 km-long embankment in North Jakarta. This development is part of its plan to build a 32 km embankment plus a water pumping station.

The city water station, which is not far from the beach, produces water that is salty and is not suitable for washing clothes or cooking. However, you can still use the water to perform ablution. Some residents must buy fresh water for their everyday needs. Penjaringan residents must spend up to 50 thousand IDR per day to buy clean water.[3]

Because only 70 percent of residents have access to clean water pipes, some have been using the groundwater for their daily needs. Given Jakarta's increasingly dense population, that results in the extraction of more groundwater. Accordingly, Jakarta's land surface is sinking and will continue to do so.

A study conducted by Abidin et al. (2011) noted that the rate of land subsidence in Jakarta during the 1982-2010 period was around 1–15 cm/year. The rate is around 20–28 cm/year in other places. Four factors cause land subsidence: (i) groundwater extraction, (ii) construction loads, (iii) natural consolidation of alluvial soil, and (iv) tectonic effects.4 So, urbanization and the behavior of the city's inhabitants, as well as rising sea levels due to melting polar ice caps, contribute to the sinking of a city. Beware.

2. "Cerita Sutiyoso soal Konsep Tembok Raksasa untuk Tangani Banjir Rob", https:// megapolitan.kompas.com/read/2020/02/06/09073831/cerita-sutiyoso-soal-konsep-tembok- raksasa-untuk-tangani-banjir-rob?page=all
3. "Pak Anies, Warga Muara Baru Beli Air Bersih sampai Rp 50 Ribu Per Har". https://news.detik.com/berita/d-4637326/pak-anies-warga-muara-baru-beli-air-bersih- sampai-rp-50-ribu-per-hari.
4. Abidin, H. Z., Andreas, H., Gumilar, I., Fukuda, Y., Pohan, Y. E., & Deguchi, T, "Land subsidence of Jakarta (Indonesia) and its relation with urban development", Natural Hazards, 59(3), 2011, 1753.

The forum confirmed that Indonesia's coastline measures 99,093 km2. Indonesia's land surface area is about 2.012 million km2, while its sea area is around 5.8 million km2 (75.7 percent); the Exclusive Economic Zone covers 2.7 million square kilometers. The Indonesian sea, which is 2.5 times larger than the land, has abundant natural resources and with them the potential for environmental services needed for economic development at the local, regional, and national levels.[30]

Indonesia's highest sources of carbon emissions are deforestation, forest and peatland fires, and the use of fossil fuels for energy. The Indonesian government has committed to reducing emissions by 29-41 percent by 2030, compared to a "business as usual" scenario.[31]

The Indonesian government has taken various steps to prevent increased carbon emissions from deforestation:

1. Declaration of a moratorium on issuing new permits for managing primary natural forests and peatlands. That began in 2011 and was given permanent status by President Jokowi in 2019.
2. Establishment of the Peatland Restoration Agency (BRG) in 2016, with plans to restore 2 million hectares of degraded peatlands, and the declaration of a peatland moratorium, which began in 2017, to protect large peatland areas.32 In 2020, the Indonesian government succeeded in reducing greenhouse gas (GHG) emissions by up to 11.2 million tons of CO2 eq, which was validated by an independent team and was recognized by Norway.[33]

How do Indonesians respond to climate change? A 2015 poll conducted by the Pew Research Center[34] on Indonesian attitudes to climate change found that only 41 percent of respondents said they are "very concerned" about climate change. Indonesian respondents are less concerned compared to those from neighboring countries, such as Vietnam (69 percent), Malaysia (44 percent), and the Philippines (72 percent). [35]

The Pew Research Center also indicated that most people are aware of the current state of climate change. Around eight in ten people say that global climate change affects humans and could continue to do so in coming years.[36]

Indonesia has a distinct position compared to other countries in terms of biodiversity. Geographically located between two oceans and two continents and possessing very high biodiversity, Indonesia has been named a megadiverse country by conservationists and biological scientists. Not only that, the territory of Indonesia is part of the flora of the Malesiana region, which is estimated to contain around 25 percent of the world's flowering plant species. Forty percent of those are endemic to Indonesia.[37]

30 *Ibid*.
31. https://www.carbonbrief.org/profil-carbon-brief-indonesia
32. Press Releases Indonesia-Norway Partnership to Deliver Local Benefits and Global Impact May 27, 2020 http://ppid.menlhk.go.id/siaran_pers/browse/2492
33. https://www.antaranews.com/berita/1519225/indonesia-optimalkan-dana-iklim-norwegia- untuk-capai-target-ndc
34. Pew Research Center is a nonpartisan fact tank that informs the public about the issues, attitudes and trends shaping the world. We conduct public opinion polling, demographic research, content analysis and other data-driven social science research. https://www.pewresearch.org/about/
35. Pew Research in Concern about Climate Change and Its Consequences. https://www. pewresearch.org/global/2015/11/05/1-concern-about-climate-change-and-its-consequences/
36. *Ibid*.
37. Cecep Kusmana, Agus Hikmat, "Keanekaragaman Hayati Flora di Indonesia", Jurnal *Pengelolaan Sumber Daya Alam dan Lingkungan,* Keanekaragaman Hayati Indonesia Baru Tergarap 5 persen". Universitas Padjadjaran, http://news.unpad.ac.id/

Another research paper stated that Indonesia is home to 15 percent of the world's biodiversity (estimated to number around 5,131,100 species). Many of Indonesia's plant varieties have medicinal properties. In addition, there are also numerous types of microbes.[38]

According to Prof. Tri Hanggono, Dean of the Faculty of Medicine at the Universitas Padjadjaran (Unpad), Indonesia has used less than five percent of its biodiversity potential. Hanggono called for more intensive research into medicinal plants to contribute to advances in healthcare. Of the 28,000 species of medicinal plants in Indonesia, 1,845 species have been identified as having medicinal potential. As many as 283 species have been explored for active compounds.

According to biologists, Indonesia's primary challenge is limited knowledge of biological sciences. Indonesia is a fertile and prosperous country with an extraordinary wealth of biodiversity. However, Indonesia cannot develop biotechnology-based production until it intensifies its biological research.

Indonesia's biological resources would be worth more than gold, precious metals, or fuel oil if developed into health products and other industrial materials.

The biodiversity of Indonesia's land and sea is the largest in the world.[39] According to the Director-General of Nature Conservation and Ecosystems at the Indonesian Ministry of Environment and Forestry, Wiratno (in the Period of Minister of Environment and Forestry Siti Nurbaya Bahar), the diversity of ecosystems on the Indonesian mainland is ranked third in the world, after Brazil and Congo. However, when its ocean is taken into account, Indonesia ranks first in the world in terms of biodiversity. It is home to five percent of the world's biodiversity.

At the same time, Indonesia faces the highest level of threat and extinction of plant species in the world. At the time of writing, 240 plant species had been declared as rare; around 36 tree species had been threatened by extinction, and around 58 plant varieties had protected status.[40]

Deforestation

According to David La Geveau et al, Indonesia has lost 6 million hectares of forest over the last 12 years. That is equal to half the area of the United Kingdom. [41]

Due to the level of carbon dioxide emissions resulting from the destruction of forests, Indonesia has become the third-largest emitter of carbon dioxide after China and the United States.

Peatlands capture 28 times more carbon dioxide than forests growing on them. However, when the peatland is cleared or logged, carbon dioxide and methane gas will continue to be released for years.

38. Eka Bahtera, "Terbesar Kedua di Dunia, Keanekaragaman Hayati Indonesia Baru Tergarap 5 persen". Universitas Padjadjaran, http://news.umpad.ac.id/
39. *Republika. Friday*, June 07 2019.
40. *Ibid.*
41. David L.A. Gaveau *et al*., "Rapid conversions and avoided deforestation: examining four decades of industrial plantation expansion in Borneo," nature.com, September 8, 2016.

The ulema's deep concern regarding forest fires began in 2015, when fires caused tremendous losses of 2.7 million ha of forest in Kalimantan, Sumatra, and Papua, which resulted in a loss of 16.2 billion USD or IDR 242 trillion. The forest fires also caused flights to be cancelled and schools to be closed, not only in Indonesia but also in neighboring Malaysia and Singapore. Crop failure and the burning of the gardens were additional consequences.

The Indonesian Ulema Council (MUI) issued a tazkirah (circular letter) asking Muslims to perform the prayers for rain (salaat al- istisqa'). Furthermore, in 2016, MUI issued Fatwa Number 30/2016 regarding the Law on the Burning of Forests and Land and their Management (Appendix 3). On this basis, MUI and the Peatland Restoration Agency (BRG) instructed mosque administrators and religious teachers to be involved in da'wah for forest and land conservation, particularly peatlands, to prevent the reoccurrence of severe forest fires. The government is also working with the community as well as with the Indonesian National Police and Indonesian National Army.

Forest Fires

The incidents that most quickly eradicate plants and animals are forest fires, which have occurred more frequently in the last 20 years. Forest fires also cause serious health problems for local people. Moreover, the smoke from the fires disturbs economic and social life, such as by causing widespread flight cancellations.

Forests are a source of livelihood for the surrounding communities. When forests are burned, people lose their primary source of livelihood. Local and national governments lose income from forest wood products, including non-timber production and tourism.

The Ministry of Environment and Forestry revealed that the area of forest and land fires in 2019 reached 328,722 hectares. That was only slightly different from the previous year, at 510,564.21 hectares.

Below are nine impacts of forest fires:

1. Damage to flora and fauna habitat
Forests are home to various types of flora and fauna. They also provide environments for flora and fauna to find food and to sustain life. If a forest is burned, the environment for flora and fauna to reproduce will be destroyed. Destruction of the habitat of flora and fauna will affect their survival in the forest.

2.Biodiversity decline
Forest fires destroy the habitats of various species of animals and plants. Without a habitat, or with a damaged habitat, animals and plants cannot live. Thus, if burned forests are not restored as soon as possible, the extinction of plants and animals will accelerate.

Indonesia is vital in terms of global biodiversity, as it has the highest number of endemic species worldwide. Moreover, as previously explained, Indonesia has the highest number of species of any country. When categorized generally, Indonesia is home to 10 percent of the world's plant species, 12 percent of the world's mammal species and 17 percent of the world's bird species.[42]

Indonesia provides a fertile land for various orchids and thousands of tropical flowers, whose fragrance spreads in tens of thousands of ways in the forest air. The various species of flower perform this to beautify the forest. Usually, birds flock to the flowers and sprinkle nectar from about 430 diverse species. However, the birds have lost their homes due to forest destruction, which has rendered several bird species in Indonesia endangered.[43]

3. Ecosystem inequality

A balanced ecosystem supports a healthy natural environment. Damage to forests caused by fires removes this balance because forests that once produced oxygen instead produce carbon dioxide. The forest's ability to absorb carbon dioxide becomes very weak, as does its ability to produce oxygen.

4. Increased vulnerability to disasters

Forest fires are disasters that lead to a series of other disasters, due to the destruction of land and ecosystems. The burned forest land can no longer hold rainwater. Thus, water can no longer be absorbed and cannot be channeled into rivers. Then the water spreads to various places and causes floods and landslides.

The land becomes dry because the roots of dead trees cannot store water by absorbing it into the soil. Dry land becomes infertile and unproductive. That reduces the supply of food and medicine, which increases people's vulnerability to various diseases.

5. Silting of rivers

Burning forests produce ash. The larger the area of forest that is burned, the more ash is produced. The ash is then spread by the wind or swept away by the water to rivers, where after a while it settles. River therefore become shallow and their water capacity decreases. So, when it rains heavily, the newly shallow rivers can no longer accommodate so much water. The water therefore overflows in various directions and causes flooding.

6. Forest conversion

It takes a long time for the burnt forests to return to their original state. Reforestation by replanting burned forest lands is difficult because of the damage to the soil. Even if the planted trees grow, the quality of the environment cannot return to its original state. Finally, due to 'benefit principles,' decision-makers usually convert this land into areas intended for different functions, such as the development of the oil palm industry.

42. Channel News Asia, "Indonesia forest fires have 'major impact' on climate." Channelnewsasia.com, Sep 26, 2019.
43. David Charles, "Scientists on Indonesia's polluting haze." ForestNews.cifor.org, 20 Sep. 2019.

7. Decrease in the quality and quantity of water resources

The burnt forest also loses several springs within it because the dead trees can no longer store water in the ground. The trees that have survived can only accommodate a small amount of water in the soil. Thus, water reserves are reduced and easily contaminated by other elements, leading to a decrease in water quality. When the dry season arrives, the water in the soil may be lost entirely, which will result in drought.

8. Air pollution and respiratory problems

The smog caused by forest fires fills the air. That limits visibility and enters people's lungs, causing respiratory problems. Eye, skin, and respiratory irritation are the direct effect of forest fires on human health. Minimal visibility interferes with daily activities, increasing the risk of traffic accidents. Moreover, another impact is the invaluable loss of animals and insects.

9. Exacerbation of global warming

The world is experiencing climate uncertainty, the earth's temperature is increasing, and forest fires are accelerating global warming.

Forest fires release carbon dioxide and other gases into the air, which contribute to the warming of the earth. Forest and land fires in Indonesia have released 360 million tons of carbon dioxide into the air since August 2019. That amount exceeds the emissions released by Spain in 2018.[44]

In addition, 43 percent of the forest burned is peatland.[45] These carbon-soiled peatlands are especially vulnerable to fire when dry. Preparation for oil palm plantations, for example, makes peatlands dry because the trees on them are cut down and the bushes are burned. This practice is often carried out by both local communities and plantation companies because it is easier to prepare and costs less.

Indonesia's dry peatland that is rich in carbon is vulnerable to fire. The establishment of oil palm plantations provides an example: peatlands become dry because trees are cut down and bushes are burned. Due to the ease of implementation and low cost, local communities and plantation companies often clear the land to create plantations.

The carbon dioxide trapped in the peatlands for tens or even hundreds of years is then released into the air through burning. The release of massive amounts of carbon dioxide from the peatlands accelerates global warming.

The explanation above clarifies that fires in the equatorial region, including Indonesia which has extensive peatlands, are responsible for 8 percent of the world's carbon dioxide emissions and 23 percent of methane gas emissions.[46]

44. *Ibid*.
45. "Hampir Satu Juta Orang Menderita ISPA akibat Kebakaran Hutan dan Lahan" Sumber: Kompas.com - 23/09/2019, 17:52 WIB https://nasional.kompas.com/read/2019/09/23/17522721/ hampir-satu-juta-orang-menderita-ispa-akibat-kebakaran-hutan-dan-lahan.
46. "Sejak Tahun 2015, Titik Kebakaran Hutan Berkurang 89%". Available at: https://katadata.co.id/berita/2017/12/19/sejak-tahun-2015-titik-kebakaran-hutan-berkurang-89

Indonesia's peatlands are among the unique ecosystems on earth. These lands are a habitat for threatened species such as the Sumatran orangutan, which is on the red list of threatened species of the International Union for Conservation of Nature (IUCN), an international organization dedicated to the conservation of natural resources.

Peatlands can smolder underground for months with no visible signs, making the process of identifying and extinguishing the fires difficult. The high water content of peatlands produces more smoke than regular forest fires. Regular forest fires do not produce much smoke, but the husks stored under the surface of the peatlands create large amounts of fog and smoke.

Forest fires also occurred in 2019. According to Kompas, nearly one million people were affected by Acute Respiratory Infections as a result of the fires. Those people were from the six provinces (Riau, South Sumatra, Jambi, West Kalimantan, Central Kalimantan, and South Kalimantan) that were struck by forest fires.[47] Schools were closed and many flight schedules were canceled.

The 2019 fires surprised many because forest fires in hotspots had decreased between 2016 and 2018. According to records from the Ministry of Environment and Forestry, in 2015 there were around 22,000 forest fires. Then, in 2017, the number of forest fires was reduced to 2,500. The area affected by forest fires was reduced by 95 percent. In 2015, forest fires covered 2.6 million hectares. In 2016, that decreased by 94 percent to 146 thousand hectares.[48]

In 2015, 2.6 million hectares of forest, including peatlands, were burned. The fires caused 1.2 million tons of carbon dioxide to be emitted into the atmosphere, which is equivalent to the emissions of the entire American economic activity in one day, according to a World Bank report.[49]

Forest fires increase global warming, while the latter stimulates forest fires.[50] So, forest fires and global warming have a symbiotic relationship based on their adverse effects on each other.

Forest destruction or deforestation, including forest and land fires, have caused biodiversity losses. With that in mind, several unique and high-value Indonesian species should be noted, including:

Orangutan

Lowland tropical forests are prone to illegal logging because they are an easy source of high-quality timber. In addition, this is the primary habitat for orangutans, beautiful animals which are increasingly threatened by extinction. The orangutans' habitat in North Sumatra is rapidly shrinking. When the forest burns, they are incapable of saving themselves.

47. World Bank Report 2016, *The Cost of Fire. An Economic Anaysis of Indonesia's 2015 Fire Crisis*. February 2016.
48. E.A. Crunden. *Climate Change is Worsening Wildfires, new study highlights*. ThinkProgress, July 15, 2019.
49. IUCN. *Primates in Peril The World's 25 Most Endangered Primates 2016–2018*, IUCN SSC Primate Specialist Group (PSG), p.75.
50. *Ibid*.

The IUCN categorizes the Sumatran orangutan (Pongo abelii) as one of the world's most threatened primates.[51] It is estimated that only around 6,000 Sumatran orangutans remain. The Bornean orangutan (*Pongo pygmaeus*) has suffered more or less the same fate. WWF estimates that the remaining population of Bornean orangutans is around 100,000.

Sumatran Elephant

The Sumatran elephant population has decreased dramatically over the last decade, along with the rate of forest destruction. In 2012, IUCN changed the category of Sumatran elephant from "Endangered" to "Critically Endangered." The remaining population is now estimated to be between 1,500 and 2,000.

Elephants play a significant role in maintaining forests and their ecosystems. As herbivores, elephants sow seeds that grow into new trees. In the dry season, elephants dig into the ground with their trunks to find water that other animals consume.

Javanese Tiger

Some rare Indonesian species are still in existence despite being endangered or critically endangered. Other animals, however, can no longer be found. The Javanese Tiger (Panthera tigris ssp. Sondaica), for example, became extinct in the 1980s. Massive deforestation destroyed the Javanese tiger's habitat, which led to its extinction. In 1975, only 8 percent of Java's forest remained. With such large areas of the forest destroyed, the tigers had difficulty obtaining food. As a result, they entered human villages. They were then often killed due to the risk they posed to human life. The tigers' extinction was therefore caused by lack of food and their killing after entering a village. Environmentalists are increasingly concerned that the Javanese deer (Cervus timorensis) will also become extinct. According to the IUCN red list, no more than 10 thousand Javanese deer remain.

Birds

Indonesia has more than twice as many birds as North America. There are around 1,539 known species, 430 of which are easy to find.[52] Many of these birds live on only one or two small islands. 140 species of birds are threatened.

In addition to the animals mentioned above, Indonesia also has thousands of reptile and amphibian species and 10 percent of the world's fauna. 28 species of reptiles are threatened with extinction, according to IUCN. Meanwhile, half of the world's fish species live in the Indonesian seas.

51. "Asap, pesawat jamaah haji Nunukan batal mendarat di Bandara Tarakan". AntaraNews. com, https://www.antaranews.com/berita/1064830/asap-pesawat-jamaah-haji-nunukan-batal- mendarat-di-bandara-tarakan September 16 , 2019
52. "Pesawat Jemaah Haji Kalbar Batal Mendarat". Tribunnews.com, https://www.tribunnews. com/regional/2019/09/16/pesawat-jemaah-haji-kalbar-batal-mendarat-19-penerbangan-di- bandara-supadio-batal September 16, 2019.

Climate Disasters and their Impacts on Life

Forest fires cause smog, which restricts breathing and visibility and disrupts flights. Many scheduled flights were canceled during the Riau and Kalimantan forest fires; some were hajj and umrah flights.

Box 4.4

The last mosque on the coastline

Nurul Jannah Mosque, founded in 2002 , was located 2 km away from the beach. It now lies on the coastline due to abrasion (Source © Ichwan Adam)

In 2002, the "Light of Heaven" (Nurul Jannah) Mosque in Cemara Jaya, Karawang, was located about two kilometers from the beach. This beautiful mosque now sits on the coastline. It is the last building standing in that area.

Abrasion has on occasion meant that this mosque cannot function properly, particularly when the seawater rises. Nevertheless, the mosque is still used when the water recedes. It is still used to accommodate Friday prayers and travelers who want to rest and pray. However, several nearby houses have been destroyed and eroded.

One hundred and ten families have moved away from the area, and only a few remain.[1] The migration of people due to climate change and rising sea levels is not fiction – it is very real.

1. https://www.pelitakarawang.com/2019/12/diterjang-abrasi-masjid-nurul-jannah.html

> "The area of the coastal slope is projected to decrease due to sea- level rise. If a high emission scenario and high climate sensitivity are applied, then the loss of marshland could reach 25 percent and 42 percent of the world's coastal marsh by the 2050s and 2100s."[2]

Those people became local refugees who migrated or fled to other places not too far away. An IOM report noted that environmental refugees reached 50 million in 2010. The IPCC even estimated that refugees from environmental disasters could reach 200 million.[3]

Most climate disasters that cause losses are hurricanes, cyclones, and typhoons. When typhoon Haiyan hit the Philippines, 7,300 people died or went missing. These disasters will become more frequent, along with weather anomalies and the imbalance of the earth as a result of global warming.

2. International Organization for Migration (IOM), Migration and Climate Change. (Geneva. IOM, 2020).
3. Stern, N., (Ed.), The Economics of Climate Change: The Stern Review. (Cambridge: Cambridge University Press, 2006), p. 3.

On September 15, 2019, a Lion Air plane carrying hundreds of hajj pilgrims from Nunukan Regency, North Kalimantan, failed to land at Tarakan Airport and returned to Balikpapan, East Kalimantan. The two hundred and fifteen pilgrims had to stay at Sepinggan Airport for several days. Then the airline transported them by land: Balikpapan-Samarinda-Berau-Bulungan.[53]

On the same day, a Sriwijaya Air plane carrying 88 hajj pilgrims from West Kalimantan from Hang Nadim Airport, Batam, failed to land at Supadio International Airport. The pilot had attempted to land by circling in Pontianak's airspace eight times, but was unable to do so due to visibility of only 500 meters. He then decided to land at Soekarno Hatta Airport.[54]

In 2015, many hajj flights to Mecca were canceled due to fog from forest and land fires. Learning from this experience, a hajj and umrah travel agency in Riau took anticipatory steps by sending its pilgrims early to Mecca.[55]

Many hajj pilgrims from Kalimantan and Sumatra were sent home early because they suffered from respiratory problems when they left the airport, which was covered in smog.[56]

53. "Muhibbah Travel Berangkatkan JCH Lebih Awal". Cakaplah.com, https://www.cakaplah. com/berita/baca/41264/2019/08/04/muhibbah-travel-berangkatkan-jch-lebih-awal#sthash. ZhzLvTT8.dpbs October 25, 2019.
54. "Asap, pesawat jamaah haji Nunukan batal mendarat di Bandara Tarakan". AntaraNews. com, September 16, 2019.
55. "Muhibbah Travel Berangkatkan JCH Lebih Awal". Cakaplah.com, https://www.cakaplah. com/berita/baca/41264/2019/08/04/muhibbah-travel-berangkatkan-jch-lebih-awal#sthash. ZhzLvTT8.dpbs 25 Oktober 2019.
56. "Asap, pesawat jamaah haji Nunukan batal mendarat di Bandara Tarakan". AntaraNews. com, 16 September 2019.

The failure of some landings and departures led to a drastic increase in flight fuel consumption. Many airlines lost money due to aviation fuel consumption and the additional costs for road trips. The hajj pilgrims also suffered due to the added cost of traveling for a longer period.

In recent decades, climate change due to environmental damage has caused water vapor and cloud production in Indonesia to vary from very high to very low or vice versa. The amount of water vapor and low clouds affects rainfall. The low intensity of rainfall causes drought.

Damage to watersheds, especially the upstream portions, reduces groundwater absorption. For example, use of upstream land has been converted to houses and villas, from forests and vegetation. As a result, due to lack of water, reservoirs and irrigation canals became silted up, and their water holding capacity sharply decreased. The stored reservoir water in the rainy season became low due to siltation. When the dry season arrives, drought is inevitable.

Drought poses many problems, such as a decrease in clean water supply, death of plants and animals, pollution of the environment, and the emergence of various diseases.

Not only clean water is reduced, but also dirty water. The obligation to perform ablution with clean and holy water must be overlooked. Because there is very little water in some mosques, worshipers must wait in long queues to perform ablution. Some congregants do not even get water. Toilets in mosques emit an unpleasant odor because there is not enough water to clean them. Thus, the quality of prayer has decreased. It is very difficult to worship in these circumstances.

In Cigunungsari, Tegalwaru, and Karawang, dozens of residents collect cloudy water mixed with mud from a waterhole every morning and evening. They have no other choice, as over the last few months their wells have dried up.

In some areas in Eastern Indonesia, people have to walk 5 to 6 kilometers to get water.

In 2019, the clean water crisis hit some regions in Indonesia. Prolonged droughts forced farmers to postpone planting schedules, resulting in a slower harvest season and depletion of food supplies. The price of basic goods increased beyond the purchasing power of ordinary people. The shortages prompted the government to import rice, sugar, and wheat flour. Apart from draining the government's budget, this policy also created domestic problems for farmers and producers.

The extinction of several animal and plant species destroys the balance of the ecosystem, reducing food quality and productivity. Economic activity therefore fails to develop and even declines. To maintain productivity, humans use chemical fertilizers and other substances that are not environmentally friendly. That results in the decline of land fertility and the emergence of various pests and diseases, further lowering productivity. The use of pesticides contaminates fruits and vegetables, which degrades the digestive system of humans who consume them. The food industry brings new, previously unknown diseases.

Forests are natural pharmacies containing various medicinal plants. Forest and land fires contribute to the destruction of Allah's gifted plants. The absence of alternative medicines has caused people to turn to chemical drugs that carry various side effects.

Damage to flora and fauna often has a more significant impact than forest fires because such damage disrupts weather and climate patterns. Meanwhile, damage to fauna results in an abnormal life cycle.

After land has been cleared or logged, many florae do not recover. One or two may recover with specific treatments, which will take at least ten years depending on the area of the land. Many trees that are felled are 20 to 30 years old. It will take more or less the same time to replace these trees.

Chapter 5
Actions to Combat Climate Change

"If the Final Hour comes while you have a shoot of a plant in your hands and it is possible to plant it before the Hour comes, you should plant it." (Hadith by Bukhari & Ahmad)

Introduction

On October 3, 2019, the environment ministers from 57 Islamic countries, members of the Organization of Islamic Cooperation (OIC), agreed to adopt an important document, "Role of Cultural and Religious Factors in the Protection of the Environment and Sustainable Development." The document was the result of the 8th Islamic conference of environment ministers, held on October 2-3, 2019 by the Islamic World Educational, Scientific and Cultural Organization (ISESCO) in Rabat, Morocco. The conference was attended by the environment ministers of Islamic countries under the high patronage of His Majesty King Mohammed VI of Morocco. Furthermore, the ministers adopted guidelines on strengthening the role of youth and civil society in protecting the environment.[1]

At the conference, King Muhammad VI also announced the setting up of the Islamic Academy for Environment and Sustainable Development. The Academy is a courageous project aiming to deepen academic thinking, raise awareness of current and future environmental and development challenges, and determine how to address challenges in governance, science, technology, and human resource capacity building.[2] In addition, the conference noted the efforts to maintain ecosystems for sustainable development.

The conference of environmental ministers of the Islamic world affirms the importance and contribution of Muslims to global efforts to mobilize all sectors of society achieve sustainability according to their beliefs. It is undeniable that the Muslim population of 1.8 billion has an essential role to play in maintaining and creating healthy conditions on Earth.

1. https://www.unenvironment.org/news-and-stories/story/islamic-conference-adopts- religion-and-environment-strategy
2. "Morocco's King announces establishing Islamic Academy for Environment and Sustainable Development".

The Islamic world has been concerned about environmental challenges for a long time. Many technocratic documents drafted by Muslim countries in response to environmental issues are evidence of such concern.[3] Several supporting documents issued in the form of resolutions, including the resolutions of the Islamic conference of Environment Ministers in Jeddah, Saudi Arabia (2002 and 2006); in Rabat, the capital city of the Kingdom of Morocco (2008); in Hammamet, a town in the Republic of Tunisia (2010); in Astana, the Kazakh word for 'capital', which is the capital city of the Kazakh state since 2012 (its name was changed to Nursultan in 2019); and in Rabat once again (2015 and 2017).[4]

The basis for the development of this document was the previous document of the First Global Forum on Environment from an Islamic Perspective held in 2000 in Jeddah, Kingdom of Saudi Arabia. Furthermore, the commitment of the Islamic Educational Scientific and Cultural Organization (ISESCO) in joint environmental action was to support the efforts of the Sustainable Development Goals (SDGs) before the World Summit on Sustainable Development (Rio +10 conference) in 2002 in Johannesburg, South Africa. This forum brought together officials and experts worldwide to discuss ways of working together and aligning positions on environmental protection and the achievement of sustainable development.[5]

The strategic document for the Activation of the Role of Cultural and Religious Factors in the Protection of the Environment and Sustainable Development suggests how religious and cultural institutions in various Muslim countries struggle to achieve global targets for sustainable development. Islam is embraced by the pluralistic society of various nations and different cultural backgrounds. Differences in nationality, language, and culture are not barriers to this religion's adherents and are among their excellent qualities.

Hence, Islam also absorbs various good and positive cultures, building a civilization therefrom. This reflection of diversity and the ability to absorb culture can be seen in the architecture of mosques in the Islamic world.[6] One such example is Menara Kudus Mosque in Kudus, Central Java, founded by Sunan Kudus, whose architecture adopts a joglo model. This mosque has a tower similar to a Hindu-Buddhist temple and a gate similar to Hindu worship temples. A different model can be found in a mosque in China which looks like a Klenteng (a place of worship for traditional Chinese believers), while a mosque in Niger is made of clay. In some rural and agricultural areas, Muslims still use *beduk/kentongan* as a sign of prayer times. That tool is for calling Muslims to perform prayer and is rarely found in other cultures and regions. Before the mosque microphone was created, the echo of *beduk/kentongan* sound could be heard loudly across the rice fields, rivers, valleys, and forests.

3. Technocratic document is a concept paper or a draft of thought to be elaborated in policies at each country and nation.
4. ISESCO, document.
5. *Ibid*.
6 Aga Khan, "Expression of Islami in Buildings: Exploring Architecture in Islamic Culture". Proceeding of International Seminar. (Jakarta and Yogyakarta, Indonesia. 15-19 October 1990).

According to the 2019 ISESCO report, current scientific and technological advances help the Muslim world understand the environment and its interaction with the biological world. This understanding also encompasses the potential damage caused by human activities such as industry, infrastructure, tourism, and agriculture development on land, sea, and air. The Islamic world has responded to that destruction: each country has developed regulations to implement legislative and institutional systems that aim to reduce the impact on the environment. Countries were however encouraged to create independent regulations aligned with global conventions.

ISESCO is a forum for dialogue for the 57 members of the Organization of Islamic Cooperation (OIC) on education, science, culture, and communication to support and strengthen relations among member countries. The OIC is a union of majority countries, after the United Nations (UN), however OIC members are also members of the United Nations.

Since the 1992 Earth Summit, the United Nations, through its specialized agency related to the environment, the United Nations Environment Program (UNEP), has supported and published many Multilateral Environmental Agreements (MEAs). There are at least four types of widely known multilateral conventions administered by UNEP:

1. Conventions related to the atmosphere,
2. Convention on Biological Diversity,
3. Convention on waste and chemicals,
4. Conventions and action plans for regional seas.[7]

Under the conventions related to the atmosphere, for example, UNEP facilitates the implementation of the Vienna Convention for the Protection of the Ozone Layer, 1985. This convention promotes cooperation among nations by exchanging information about the effects of human activities on the ozone layer. States party to the agreement meet once every three years to make decisions to tackle ozone depletion.

Meanwhile, conventions related to biodiversity consist of:

1. *Agreement on the Conservation of African-Eurasian Migratory Waterbirds* (AEWA) .
2. *Agreement on the Conservation of Small Cetaceans of the Baltic & North Seas* (ASCOBANS)
3. *Agreement on the Conservation of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area* (ACCOBAMS)
4. *Agreement on the Conservation of Populations of European Bats* (EUROBATS1991)
5. *Convention on International Trade in Endangered Species* (CITES 1973)
6. *Bonn Convention on Migratory Species* (1979)
7. *Convention on Biological Diversity* (1992)
8. *Cartagena Protocol on Biosafety* (2000).[8]

7. https://unep.ch/iuc/geclist.htm accessed May 12, 2020.
8. *Ibid*.

The essence of the environment in ecology has shifted. In the 19th century, the relationship of organisms to their environment could sustain the biosphere in all its components. Such a fact places humans at the center as the cause of environmental destruction. Now, however, the emphasis is on humans bearing a responsibility to overcome barriers to ecological transformation, having learned about the network of relationships in the environment in which they live and experiencing disturbances, resource depletion, and pollution caused by climate change.

Through religious and ethical education, ecological transformation is needed to activate spiritual values and scientific findings connected to appreciation of the environment. This activation will ultimately lead to an environmentally friendly economic movement and promote sustainable production and consumption. That movement requires special educational efforts to change lifestyles, livelihoods, and ownership as well as to increase public awareness. Particular importance must be placed on awareness of the relationship between religion and the environment, with the goal of achieving the harmonious spiritual life needed in religion and in the goodness of our environment.

In 2012, Qatar hosted the Conference of Parties (CoP)-18, the United Nations Conference on Climate Change. Qatar's involvement reflects the concern of Islamic states at the global level. When activists from the Arab world claimed that Muslim leaders were silent about global warming and environmental issues, Qatar emerged as a representative of the Islamic world in response to climate change.[9]

9. "Activists at COP18 in Qatar: Islam and the Arab-world Not Eco Enough". https://www. greenprophet.com/2012/12/climate-change-arab-islam-doha/

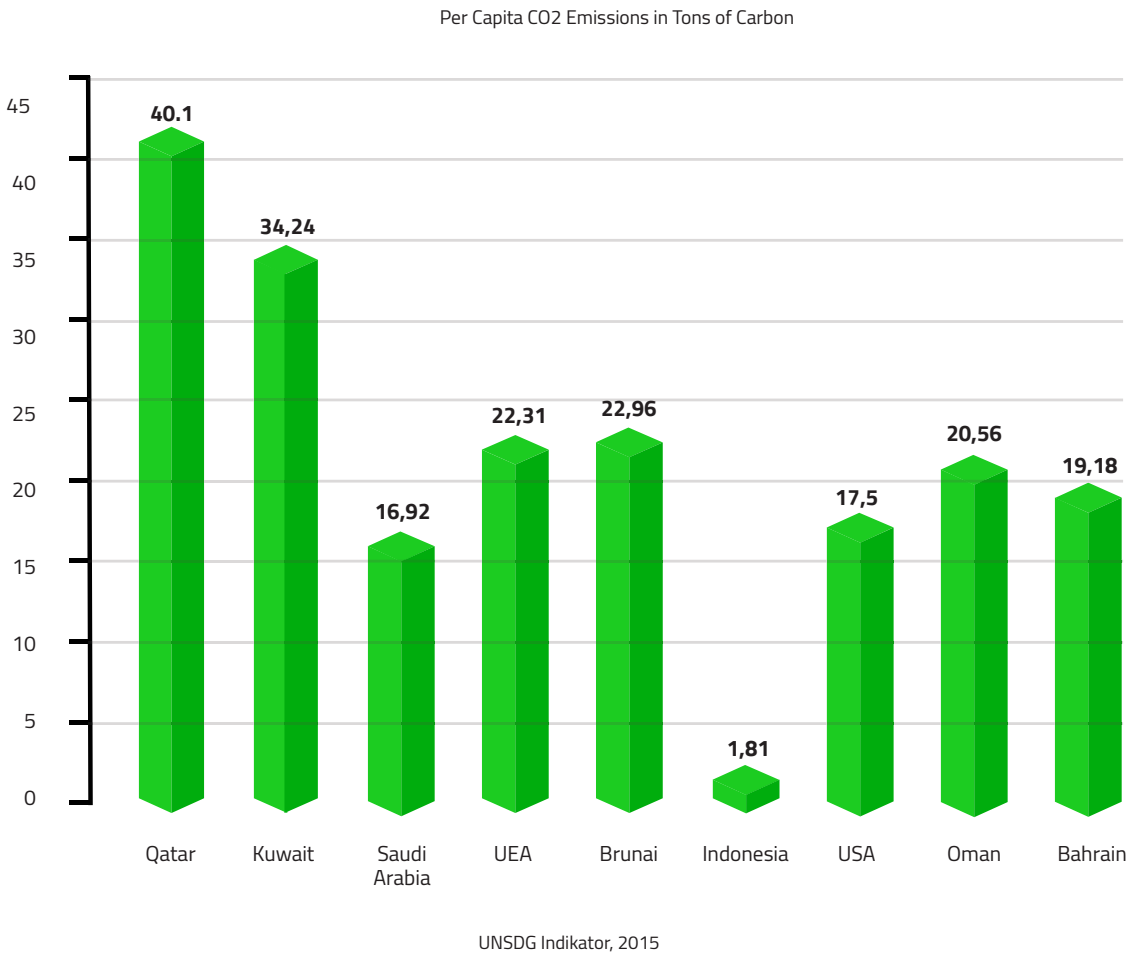


Figure 1: Emissions per capita of several Muslim countries, compared to per capita emissions in Indonesia (Processed from UNSDG Indicator 2015)

"Arab countries, not environmentally friendly," they said. Arab activists from Lebanon asked Arabs to be part of the solution. Qatar is one of the world's most polluting countries, with the greatest carbon footprint per capita. Like other countries in the Arab Gulf region, its economy is built on wealth from natural resources (oil and gas) and extravagance. However, other Muslim countries that are part of the Arab league are also developing countries such as Egypt, Jordan, and Lebanon, in addition to Iran. The dilemma is that some countries in the Middle East are still at war, such as Syria, Iraq, Libya, Palestine, and Yemen.

The most important oil-producing regions are in the Middle East and North Africa, often called MENA. The MENA region commands excessive human and natural resources and on average enjoys a proper standard of living. MENA covers a surface of over 15 million square kilometers and contains some 6 percent of the world's population. The three smallest countries (Bahrain, Djibouti and Qatar) each comprise around half a million inhabitants. The two largest countries (Egypt and the Islamic Republic of Iran) each have a population of around 60 million inhabitants.

Algeria, Morocco, and Sudan are also large countries. These five most populated countries account for roughly 70 percent of the region's population. Approximately half the population lives in cities.[10]

10. "Growth and Stability in the Middle East and North Africa". See, https://www.imf.org/ external/pubs/ft/mena/04econ.htm retrieved May 20, 2020.

Islamic Declaration on Global Climate Change

On August 17-18, 2015, Muslim academics gathered in Istanbul to hold a symposium on climate change. The meeting was attended by many environmental and climate academics and experts, as well as faith leaders from the Islamic world. The symposium resulted in the Islamic Declaration on Global Climate Change (see Appendix 3). The declaration — which is only a few pages — shows the world that Muslims can step up to solve the ongoing climate crisis. Fazlun Khalid, Founding Director of the Islamic Foundation for Ecology and Environmental Sciences (IFEES), and the other six members of the drafting team, expect that this declaration will be a guideline that directs all Muslims to participate with other inhabitants of the earth.[11]

While Muslim countries have signed binding UN climate change agreements, such as the UNFCCC, this declaration was initiated by civil society organizations. Thus, the participating environmental scientists and activists delivered clear guidelines for how to act fast by changing lifestyles, stopping greenhouse gas emissions, and returning to renewable energy. This declaration is expected to mobilize Muslims across the world to slow down and adapt to reduce climate change. This declaration is based on Islamic views and teachings regarding climate change. As such, this text will be beneficial as a guide for climate education, especially in the Muslim world. [12]

As stated in the Declaration, climate change today differs from what occurred in the past because it is driven by human activity. Modern humans have become a force that dominates nature. Our species could cause the end of life on this planet as we know it today.

The Declaration also cites the Millennium Ecosystem Assessment (UNEP, 2005), which underscores that humans have made more tremendous changes to ecosystems in the latter half of the 20th century than at any time in human history. These changes have improved human well-being but have been accompanied by ever-increasing environmental degradation. The Declaration also asks Muslims, in particular, to listen to the opinions of over 1,300 scientists from 95 countries who have warned that two-thirds of the natural systems that support life have been degraded by human actions.

This call of the Declaration can be seen as an articulation of the involvement of the Muslim world in responding to climate change, providing support for the Muslim Delegation at COP 21 in Paris to engage seriously in dialogue and to produce strong negotiations to defend the future of the planet.

11. Apart from Fazlun Khalid, the initiator of the declaration, the Drafting Team members include: Prof Ibrahim Ozdemier (Turki); Prof Azizan Baharuddin (Malaysia), Othman Llewellyn (Saudi Arabia), Dr Fachruddin Mangunjaya (Indonesia) dan Dr Abdel Majid Tribak (Morocco).
12. This paragraph is taken from the article of Fachruddin Mangunjaya, "Deklarasi Islam untuk PerubahanIklim." *Republika*. August 29, 2015.

The Declaration is sharp and concise, containing a preamble and concerns. Furthermore, it takes reference from a verse of the Qur'an on the importance of maintaining balance (*mizan*) on Planet Earth, so that humans would not transgress the balance created by Allah SWT (Surah 55: 7-10). Planet Earth is now in danger of losing its balance due to excessive CO2 emissions in the atmosphere. The global average amount of carbon dioxide has now reached 400 ppm, compared to only 280 ppm in pre-industrial times. That causes a rise in temperature due to excess heat being trapped on Earth, resulting in global warming and climate change.

Notably, the Declaration is addressed to all Muslims: Heads of state, political leaders, business communities, UNFCCC delegates, religious leaders and scholars, mosque congregations, Islamic endowments (*awqāf*), community leaders, and civil society activists. It urges them to take action to reduce climate change that is causing the Earth created by Allah SWT and all its inhabitants to be threatened by extinction. Humans are encouraged not to be arrogant about the power of technology.[13]

Will this declaration move the hearts and actions of Muslims? As a member of the drafting team for the Islamic Declaration on Global Climate Change, I cherish that hope.[14] Here are some solutions and actions that I hope will be implemented in the Islamic world.

Ekopesantren /Eco-Pesantren

Eco-pesantren is a new term for an Islamic educational institution (pesantren/ Islamic Boarding School) that is dedicated to environmental actions. In general, eco-pesantren is a term used to grant awards to Islamic boarding schools involved in environmental and nature conservation.

The eco-pesantren program was initiated by the Ministry of Environment (KLH) in 2008. The agreement was established between the Ministry of Religion and the Ministry of the Environment (KLH) and Islamic education institutions. The program's launch was announced and encouraged by the Ministry of Environment. It has received an enthusiastic response from more than 28,000 Islamic boarding schools in Indonesia, with 5 million students throughout the country.[15] As an educational institution for future Muslims generations, pesantren has the potential to become the driver of change in Islam. In addition, as a religious educational institution that develops religious teachings (*tafaqahu fi al din*), pesantren has an essential task in demonstrating environmental harmony.

13. "Islamic Declaration on Global Climate Change," the translations in various languages can be checked here: http://www.ifees.org.uk/declaration/
14. The members of Drafting Team of this declaration are six figures(http://www. ifees.org.uk/declaration/declaration-team/):
    1. Fazlun Khalid–Funding Director of IFEES.
    2. Dr Fachruddin Mangunjaya– Vice-Chairman of the Centre for Islamic Studies at the National University in Jakarta, Indonesia.
    3. Othman Llewellyn– Environmental Planner at Saudi Wildlife Authority and a member of the International Union for the Conservation of Nature's World Commission on Protected Areas and World Commission on Environmental Law.
    4. Professor Azizan Baharuddin– Deputy Director General of the Institute of Islamic Understanding Malaysia, a member of UNESCO's International Bioethics Committee, chair of the Malaysian Bioethics Council, and Chair of the National Committee of Interfaith.
    5. Professor Ibrahim Ozdemir: Professor of Philosophy, Ecology and Religion at Ankara University, Turkey, and author of The Ethical Dimension of Human Attitude Towards Nature.
    6. Dr Abdelmajid Tribak– Head of Environment at ISESCO, Morocco and winner of the Mohamed VI Prize for Islamic Thought and Studies for his book on Islam and Environment (2007).
15. https://www.hidayatullah.com/berita/nasional/read/2020/02/14/178098/total-18-juta-santri- dan-28-ribu-pesantren-di-indonesia.html

Since the launch of the program in 2008, and even before, many Islamic boarding schools have been registered as eco-pesantren. Several Islamic boarding schools have received the Kalpataru Award,[16] such as Annuqayah in Madura, Pesantren Hidayatullah in Balikpapan (Kal-Tim) and PP Al Itifaq in Ciwidey (West Java). Several Islamic boarding schools have created programs on environmental subjects, such as pesantren Nurul Iman with its organic waste processing program. Several Islamic boarding schools have used biogas as an energy source to support their kitchens, such as Daarul Ma'rifat-Gontor III in Kediri, which has around 1,500 students (2020).

Pesantren Darul Ulum Modern in Lido, Sukabumi, is a pesantren that benefits from its surrounding environment and network. This pesantren is close to Gunung Gede Pangrango National Park, which is a conservation area. This pesantren created a nature lovers club and routinely controls campus cleanliness and cleaning activities. Pesantrens also have a natural conservation area, a forbidden area (haram zone) that protects river borders, in practice of Islamic wisdom.[17] Every river has a prohibition zone, in accordance with the practice of Islamic city design for the preservation of nature and water. In this zone, the original riverbank must be maintained, and no buildings may be built on that area to protect ecosystem balance, erosion resistance, and rainwater absorption. Yasin Dutton called it "... land that has the characteristics of a combination of those that have been and have not been developed. Every development, whether wells, houses, or planted land, must be connected to a haram or forbidden zone, and this haram varies in size."[18] By maintaining this haram zone, pesantren has never experienced drought and has always been supplied by clean water, and even artesian water comes out without being pumped in the area surrounding pesantren Darul Ulum Modern.

Ekopesantren Daarut Tauhiid, in Lembang, is a boarding school that proves its eco-pesantren brand by making the design of pesantren building align with environmentally friendly principles. For example, buildings are made from organic materials such as bamboo. Meanwhile, the Rahmatan Lil Alamin mosque is designed to be environmentally friendly, with tropical architecture which saves energy and water. According to KH Abdullah Gymnastiar, the eco-pesantren is designed as a social space aimed at education, especially educating people on environmental sustainability.[19]

People are aware of the importance of eco-pesantren, but the involvement of eco-pesantren in this movement has not been recorded clearly. Several independent studies have been carried out that show pesantren being active and paying attention to environmental activities. Mangunjaya mentions nine environmental programs that Eco-pesantren carry out:[20]

1. Human resources for environment
2. Integration of Environmental Fiqh Programs
3. Water Management Programs
4. Energy Management Programs
5. Transportation Management Programs
6. Hazardous and toxic materials Programs
7. Waste Management Programs
8. esantren Land Management Programs
9. Healthy Living Programs
10. Biodiversity Programs

16. Kalpataru is an official award from the Government of Indonesia in the field of environmental conservation.
17. Izz al-Din, Mawil. *Environmental Dimension of Islam* (Cambridge, England: Lutterworth Press, 2000).
18. Yasin Dutton, "Natural Resources in Islam". In F. Khalid & J. Obrien. *Islam and Ecology*. (London: WWF., 1992).
19. https://www.gomuslim.co.id/read/news/2020/01/02/16750/-p-eco-pesantren-daarut-tauhid- jadi-contoh-aset-wakaf-yang-edukatif-p-.html
20. Fachruddin Mangunjaya, *Ekopesantren: Bagaimana merancang pesantren ramah lingkungan?* (Jakarta: Yayasan Obor Indonesia, 2014).

These programs for pesantren may be developed and carried out independently. For example, pesantren Nurul Haramain in Lombok exhibits point 6, managing the use of pesantren land. This pesantren has reforested its 17 ha of land since 2005 and is now reaping the benefits of clean running water. This activity has attracted the attention of people surrounding the pesantren, and its accomplishment has become the role model for them.[21]

Many pesantren in Indonesia have stepped up, performing many practical activities. Their exceptional record can motivate other pesantren. Although every pesantren has a unique typology, the enthusiasm to learn following the spirit of *tafaqquh fi al-din* should be strengthened.

Eco-Mosque

Mosques play an essential role in improving worship performance and creating social and economic ties in the local community. A mosque is a place of ritual and social worship. Social worship activities include studying, developing the community economy, and coordinating the distribution of zakat to those entitled.

Prophet Muhammad built the first mosque, the Quba Mosque, and later the Prophet's Mosque (*Al-Masjid an-Nabawi*), in Medina. The function of the mosques can be seen through the Prophet's practice in establishing them. Prophet Muhammad SAW carried out the transformation of knowledge and met with his companions in the mosque to discuss and make decisions on important issues.

Ahlus-suffah (a group of Muslims who lived at the rear side of *Al-Masjid an-Nabawi*) had no place to live but cared for and studied religion in the mosque. Mosques can be places that link prayer and social activity, such as helping people and spreading kindness. Several mosques in the Islamic world complete their complex with madrasas, hospitals, libraries, and private museums.[22]

Mosques can be used as places for lifelong learning. Muslim countries work to construct mosques as places for da'wah and centers for answering questions about Islam. A mosque should be the light that educates and enlightens people and that fights illiteracy.

A mosque is also a place for religious events, a place to celebrate and gather togetherness for the good of Muslims, a place for education, a place for gathering, communicating, and thinking to find solutions to common challenges faced by the community.

The mosque is a place to learn and to transmit religious and contemporary knowledge on nature and the environment.

21. TGH Hasanain Juwaini : Pohon Bertasbih dan Mencukupi Keperluan Pesantren https:// www.youtube.com/watch?v=Fg9pYmKYJiw
22. Aga Khan, "Expression of Islam in Buildings: Exploring Architecture in Islamic Culture." Proceeding of International Seminar. Jakarta and Yogyakarta, Indonesia. 15-19 October 1990, page. 16.

So, in the mosque, the transformation of knowledge and action to save the environment begins by raising the awareness of the congregation. Islamic countries are therefore encouraged to initiate their role in spreading awareness of the need to protect the environment and respect nature. They must take action to implement environmentally friendly development activities.[23]

The Friday sermon in the mosque should encourage good deeds, as the message that is read in every sermon indicates:

> "Lo! Allah enjoineth justice and kindness, and giving to kinsfolk, and forbiddeth lewdness and abomination and wickedness. He exhorteth you in order that ye may take heed."[24]

Solar Panels (grey) on the roof of the Istiqlal Mosque (source © photo taken by Fachruddin Mangunjaya, 2021)

Mosques ought therefore to be a medium for encouraging sustainable, healthy lifestyles and for supporting the spiritual aspect of nature and all of Allah's creatures. At any rate, mosques play a central role in raising awareness of environmental conservation and climate change. Green mosque projects have been carried out all over the world. In the UNFCCC COP 21 Climate Conference in Marrakesh, Morocco, the Maghreb region announced that around 600 large mosques would be fitted with solar panels. Kutoubiyah Mosque, a historic old mosque and the pride of the Marrakesh community, was founded in the 12th century. Thus, the congregations learn that their mosque can contribute to reducing emissions and pollution that cause greenhouse gases.[25]

23. ISESCO, The strategy for activation Religious and Cultural Factors.
24. QS 16:90.
25. Chris Bentley. 2017. Muslim environmentalists give their religion — and their mosques—a fresh coat of green. January 04, 2017 https://www.pri.org/stories/2016-12-30/muslim- environmentalists-give-their-religion-and-their-mosques-fresh-coat-green

In Morocco, mosques are mandated to produce 34% fewer emissions by 2030, in support of the Paris climate agreement. In 2016, as part of the green mosque pilot project,100 mosques were renovated, including the two most prominent mosques in Marrakech. The country currently relies on fossil fuels to meet its surging energy requirements. Like other countries, its energy needs are increasing. Electricity demand has doubled in the past ten years, partly due to new infrastructure projects. Around 97% of the oil, gas and coal Morocco requires is imported.[26]

Solar panels cover the roofs of mosques in villages in Morocco. That aids to absorb solar energy, help farming neighborhoods, and reach the goal of producing 52% of energy from renewable sources by 2030. Morocco has around 15,000 mosques, and many initiatives to develop green mosques have been carried out since 2017. Architecturally, many mosques in Morocco have adapted to the surrounding area's climate.[27]

Box 5.1

Waqf for Water

In the Islamic world, access to drinking water remains below the world average (83.7%). Only 79.19% of people in the Islamic world are guaranteed access to drinking water (CESRIC 2019). The water crisis has been a cause for concern in some areas in Indonesia, which has encouraged philanthropic organizations to develop *Waqf* programs for freshwater resources. Rumah Zakat, a social organization, launched the *Waqf* for Water program to help the community obtain freshwater resources. That included an initiative to construct water resources in villages in 29 districts, 18 of which have been built.[1]

Gunungkidul, Yogyakarta, often experiences drought in the dry season. Glagah of Nglegi village of Patuk district is one of the places that experience drought; the land is barren and it is not easy to find clean water resources for daily needs. Soejati, a resident of Gunung Kidul, distributed *Waqf* for wells and clean water infrastructure through the Rumah Zakat *Waqf* program in collaboration with Omah Sinau. This infrastructure aids the residents of Glagah, Gunung Kidul.

The donors are the members of Omah Sinau, which has a program called Gerbu (donating one thousand rupiahs every week). Housewives contribute one thousand rupiahs per week to participate in the *Waqf* for freshwater resources. The *Waqf* of the well currently provides benefits for 75 families (200 people), two mosques, and one kindergarten in the three villages of one district. Prior to the provision of wells, the parents of students at Quatul Islam Kindergarten took turns providing clean water for the children's needs by filling the school bathtub.[2]
(Source: Republika, October 24, 2019)

1. Wakaf Sumber Air Lewat Nusantara Darurat Kekeringan. Republika.co.id, October 24 , 2019
2. https://republika.co.id/berita/q1kx83368/wakaf-sumur-jadi-solusi-kekeringan-di-dusun- glagah

26. https://www.bbc.com/future/article/20170927-can-a-place-of-worship-power-a-village
27. https://www.bbc.com/future/article/20170927-can-a-place-of-worship-power-a-village

Indonesia launched the first model of an eco-mosque with Azzikra Mosque, Sentul Bogor. This green mosque was launched in 2016. Each month, Azzikra Mosque is filled with congregations carrying out remembrance activities, accommodating 22,000 people. The mosque's congregation stays at least a day and a night. Its facilities include toilets, showers and ablution areas. This mosque requires at least 20,000-40,000 liters of water for ablution. It is therefore necessary to manage the water for ablution. Azzikra collects rainwater in storage barrels, provides a filter for each ablution water faucet, and recycles ablution water mechanically.[28]

Dubai Eco Mosque was designed as an eco-friendly mosque. This mosque saves 25 percent in energy and 50 percent in water. It is clear that Muslims have grasped the language of sustainability.[29]

The green mosque design has also reached Britain, in the Cambridge Central Mosque, which has a capacity of 1,000 worshippers. The mosque has a prayer hall, ablution areas, and accommodation for its Imam's family and visiting scholars. The mosque is environmentally friendly due to its zero-carbon on-site emissions, rainwater harvesting, and air source heat pumps. Julia Barfield, the principal architect, stated that this mosque is "a truly British mosque in the 21st Century."[30]

Cyberjaya mosque in Malaysia was constructed in an environmentally friendly manner. It adopted traditional Malaysian carvings and modern Malaysian Islamic architecture and adapted to the tropical climate. Cyberjaya Mosque is an example of a future green city. Tohid and Zainon described the characteristics of the green mosque as follows;

1. sustainable construction,
2. energy efficiency and green buildings,
3. comfortable airflow,
4. operation and maintenance.[31]

The Indonesian Ulema Council (MUI) designed an eco- mosque program. According to the Indonesian Mosque Council (DMI), there are 800,000 mosques in this Muslim-majority country. This is probably the largest number of mosques in any country. Therefore, initiating environmental action from the mosque is a real opportunity to bring about change. The Ekomasjid/Eco-Mosque project is carried out under the Center for Environmental and Admire of Natural Resources (LPLH-SDA) MUI. This project has long- and short-term programs and aims to: "Improve the effectiveness of da'wah and actions in measurable ways as the embodiment of Islam that brings mercy to the entire universe." As written on its website (ecomasjid.id), the MUI Eco-Mosque project has the following foundations:

1. Promoting people's independence in countering the threat of water and energy scarcity.
2. Raising awareness on the aspects of idarah (management), imarah (prosperity activities), and riayah (maintenance and procurement of facilities).
3. Building synergies with the community and with the government.
4. Building independent and sustainable mosque management.

28. https://www.dw.com/id/masjid-ekologis-memberi-teladan-manajemen-air-cerdas/av-52182599
29. Available at https://www.youtube.com/watch?v=5yS-m-L4884 and the design of Sustainable Mosque https://www.youtube.com/watch?vr=ReS0cS4XCzM
30. https://www.bbc.com/news/uk-england-cambridgeshire-48044025
31. Zainon Tohid & Asiah A. Rahim, "Sustainable Masjid Architeeture and Public Building", 6th Asia-Pacific International Comforrenceon Ervironment-Beliaviour Studies, ETSAB, Barcelona, Spain Augustus 31 –September 15, 2015

Eco-Mosque has a website (ecomasjid.id) that provides practical guidance on creating an environmentally friendly mosque. For example, guidance on implementing water-saving principles (collecting rainwater and saving water in ablution), instructions for using solar panels and biogas to save energy, and guidance on making infiltration wells and efficient waste incinerators to burn waste that can no longer be recycled.[32]

Since 2016, Muslims in America have started designing green mosques to be more environmentally friendly. These efforts have involved the congregation by distributing guidelines such as

"How to Green your Masjid."

The website mentions seven criteria that must be met before a mosque can be categorized as a green mosque (eco-mosque)[33]

1. An Inclusive Green Message

Most mosques in the UK and the Middle East are melting pots of various cultures, so talking to people about environmental matters requires a multilingual and multigenerational approach. Addressing people in the language they feel most comfortable with (that could mean booking a multilingual speaker to address environmental issues) is an important step. Posters should be appeal to the older generation and to young people by referencing issues that are most relevant to them.

2. Water Management Policy

Building a culture of water saving is not only in line with the *Sunnah* but is also a great way to get people thinking about the other resources that may be wasted through their energy use. Signs should be installed to warn people to limit water usage and to ask that leaky taps be fixed immediately. All this is linked to hadiths, in which the Prophet Muhammed said that water should be used with care.

3. Harness Green Energy

Once the congregation is educated on water saving, the next step is to get them thinking about the energy they use and where it comes from. Encouraging a reduction in energy usage should be carried out by promoting the 'switch-off when not use' policy and thinking about switching to a green energy provider. Mosques can install solar panels, which are widely used in the Asian region. Solar panels are adapted to environmentally friendly architecture and open up a lot of space to take advantage of the wind.

4. Green Events and Activities

It is probably a daunting task for beginners to learn to care for the environment. An effective alternative might be to introduce the concept with various activities, such as green-*Ramadan*, recycling lessons, promoting fair trade, and even speaking to those attending educational classes at the mosque. These short and sweet methods introduce people to such issues. It will get them thinking about why the mosque is pursuing specific policies and what they can do in their everyday lives to support this.

32. See, http://www.ecomasjid.id/
33. https://www.greenprophet.com/2012/06/the-eco-mosque-checklist-7/

5. Green Transport
Moving from one place to another is a part of life. There is no lifestyle that does not involve transportation. Green transport is essential, whether that means walking more or encouraging the congregation to travel to the mosque using eco-friendly means.

6. Edible Garden
The mosque land and vacant land next to the mosque can be used to demonstrate how to make good use of the surrounding area. Eco-friendly, organic and practical gardening can be performed in that land. People can enjoy the greenery around the mosque and earn money for mosque maintenance.

7. Green Islamic Bank Account
It is likely that many treasurers or ta'mir of mosques do not place the mosque funds in Islamic banks. Islamic banks are relatively safe because they avoid investing in the arms, tobacco and alcohol industries, and they gradually learn to care about ecological interests. By depositing the mosque's fund in Islamic banks, activists are encouraged to act in an ecologically sensitive manner, even though many may not necessarily be green banks.

Green Hajj

Hajj is the fifth pillar of Islam. This pillar plays an essential role in communication and association among Muslims. It is an opportunity to discuss the growing issues relating to the lives of Muslims. Hajj is performed by millions of Muslims around the world. They use various means of transportation, consume large amounts of food, water, and, of course, leave enormous amounts of waste. This indicates that the pilgrimage process could stimulate an awareness in pilgrims that the environment ought to be better protected, both in the Holy Cities of Islam and other places.

In 2018, during Hajj, Saudi Arabia produced 4,000 tons of waste per day or 40,000 tons in 10 days,[34] And, in 2019, the amount of waste left by the pilgrims reached 19,381,500 kg, or 19,000 tons.[35] Although Saudi Arabia prepared 1.5 square km of land to process the waste, it would be better to reduce the waste altogether. Changing the attitudes of pilgrims and travel agents to be more concerned with the environment would contribute to the reduction of waste. Environmentally friendly measures might include minimizing or even eliminating plastic, or switching to using organic products that can be destroyed in a short time.

Performing hajj should enable a Muslim to achieve physical, spiritual, and moral harmony. The large numbers of people that form the congregation empower each person's connection to Allah SWT through prayer. Before leaving for Hajj, it is equally important for the pilgrims to improve their manners in their treatment of other people, nature, and other creatures. In 2012, the idea of green hajj was launched, starting with the creation of a guidebook distributed in various languages. In 2016, the guide was simplified into a smartphone application. The Environmentally Friendly Hajj Guide guides pilgrims before, during, and after performing the pilgrimage.

34. "Saudi Arabia Tangani Sampah 4000 ton Perhari Selama Musim Haji". https://www.antaranews. com/berita/728879/saudi-tangani-4000-ton-sampah-hari-selama-musim-haji.
35. "Uang Hilang dan Sampah, Menjadi Catatan Haji 2019". *Media Indonesia*, September 9, 2019. https://mediaindonesia.com/read/detail/258113-uang-hilang-dan-sampah-jadi-catatan-haji-2019

The actions of individuals and institutions are decisive in the campaign to care for the environment. Still, the government, represented by the Ministry of Hajj or the Ministry of Religion, should encourage pilgrims and produce regulations that guide them to pay attention to the environment. The following aspects should be part of the Environmentally Friendly Hajj Guide:[36]

1. Prepare to perform your Hajj in earnest.
2. Walk lightly and travel responsibly in the spirit of Islam.
3. Buy environmentally friendly items.
4. Choose a travel agent that cares about the environment.
5. Do not buy plastic bags or bottles to carry during Hajj.
6. Purchase fair traded goods and organic products.

During the pilgrimage, you should reduce energy consumption. The energy used today, at your home and during Hajj, is derived from burning natural resources. Fossil fuels cause greenhouse gas emissions—air pollution—and thicken the atmosphere, leading to global warming.

As a Muslim, you must perform good deeds starting at home, for example, reducing energy consumption:

- Turn off lights when not in use.
- Reduce, Reuse, Recycle.
- Enlarge green spaces, e.g., by planting trees.
- Purchase energy-efficient bulbs and appliances.
- Use rainwater, for example, to water your garden.

Upon the arrival of pilgrims in Saudi Arabia, the most commonly used forms of transportation are cars and buses. It is also recommended that pilgrims use the "Mecca Metro," known as the "Al Mashaaer Al Muqaddassah Metro." This high-speed train began operating in 2015/2016 and only operates seven days a year during the Hajj season. The use of the "Mecca Metro" helps reduce traffic jams and pollution. In 2019, train operations were improved so that they could carry more than 1 million passengers over the course of 45 hours from Mina to Arafa, as well as *Jamrat al-Aqaba*. [37]

Since 2018, the "Haramain High Speed Railway" has been available, traveling from Mecca to Medina in 2-3 hours. This train carries around 60 million pilgrims per year, including 2-3 million Umrah pilgrims. As of December 2019, six lines serve Terminal 1 at King Abdul Aziz International Airport which use the "Haramain High Speed Railway" connecting Mecca and Medina.[38]

36. Husna Ahmad & Fachruddin Mangunjaya, *Panduan Haji Ramah Lingkungan* (Jakarta: Yayasan Obor Indonesia, 2012).
37. "Al Mashaaer Metro transports over one million pilgrims in 45 hours," https://saudigazette. com.sa/article/574486
38. Haramain launches Jeddah airport service at 300 km/h, https://www.railwaygazette.com/ high-speed/haramain-launches-jeddah-airport-service-at-300-km/h/55338.article 11 Dec 2019, retrieved May 20,2020

Generally, the guidelines for the green hajj, or eco-friendly hajj, cover various efforts to make efficient use of natural resources as well as to prevent greenhouse gas pollution (emissions) and take steps to care for the environment, including:

Use Water Wisely

- Prophetic tradition teaches Muslims to use water sparingly, even if one obtains water from the river.

Choose an Eco-friendly Airline

- The latest plane models tend to fly efficiently and are non- polluting.

According to climate expert Armi Susandi (2012), individual emissions produced when a pilgrim journeys from Jakarta to Jeddah amount to around 2.83 metric tons of CO2. If there were 230,000 pilgrims in 2011, the emissions generated from their flights would be 230,000 × 2.83, which equals 650,900 metric tons of CO2. Suppose a tree is planted with a CO2 sink capacity equal to 150 metric tons of CO2/ha, or about 50 people for 1 ha. If 650,900 metric tons of CO2 must be absorbed, more than four thousand ha of new forest must be planted in one year to account for the journey for all Indonesian pilgrims. That is same as the area as Pekalongan or Medan.

Choose a Hotel that Cares about the Environment

- Do not leave it to travel agents to book your hotel; travel agents often book the hotel a year or two in advance, and they rarely take environmental responsibility into account in their decision- making. Do your research to determine which hotels are committed to green practices.

Use Recycled Tumblers/Bottles

- Hundreds of millions of plastic bottles are wasted in every Hajj trip. It is more efficient to use recycled bottles, to eliminate single-use bottle waste. By using self-recycled bottles, you will contribute to reducing the waste that pollutes the two Holy Lands, Mecca and Medina.

Avoid Plastic Bags

- Do not use plastic bags; bring your reusable cloth bags.

Buy Local

- Swap familiar fast-food chains that import their ingredients from Europe and South America for independent cafes and restaurants that use local products. The same goes for souvenirs; buy from vendors selling products made locally.

Join the Movements

- Join climate action groups or environmental NGOs, take part in tree planting activities, enroll in eco-masjid or eco-pesantren activities, and help educate the Muslim community in Indonesia or elsewhere about their responsibilities as guardians of the earth.

Islamic Finance

Martin Palmer, a Christian leader, interfaith leader, and the Secretary-General of the Alliance of Religions and Conservation, admits that the financial system suited to responding to environmental challenges is the Islamic finance system (Islamic Finance).[39] He declared that Islamic Finance is more advanced than conventional banks. That is because Islamic finance does not allow usury and money trading. Bank profits are based on profit sharing and are measured transparently and openly. In addition, Islamic banks provide loans for customers who propose a halal and good business, such as commerce, animal husbandry, agriculture, halal businesses such as restaurants, etc. Islamic banks will not fund prohibited businesses, such as liquor businesses or immoral entertainment venues.

Islamic banks have an oversight authority, or a *Sharia* Board. In this way, Islamic banks make an essential contribution by not providing loans to customers who will use their funds for initiatives that impact the environment. That would be contrary to their objectives (*maqasid al shariah*). A study in Bangladesh revealed that Islamic banks have also contributed to green banking, which improves the environment as a means of cost and energy saving, conservation of natural resources, and respect for all living beings.

Islamic finance could play an essential role in supporting the implementation of the Sustainable Development Goals (SDGs). In the face of significant financing demands for the SDGs, Islamic finance has untapped potential as a substantial and non-traditional source of financing. If organized well, Zakat as a pillar of Islam can also play an essential role in the social dimension of sustainable development. Apart from environmental endowments, Islamic history has seen exemplary models for the protection of animals, development of green spaces and other activities. Islamic finance has grown quickly, at a rate of 10-12% yearly over the past two decades. By 2015, the industry surpassed US$1.88 trillion in size. Islamic finance has materialized as a valuable tool for financing development around the world, including in non-Muslim countries.[40]

Islamic finance also recently synergized with Indonesia's goal to develop a green economy. In 2018, Indonesia formally issued sovereign green bonds—green Sukuk—in leveraging private finance for sustainable development (SDG Philanthropy Platform 2019). Nearly $1.25 billion USD was raised to cover five years. Such a level of issuance is close to oversubscription, indicating the existence of a good market for sustainable and responsible investments. A large number of investors, including conventional and green investors as well as Islamic finance, are now involved.[41]

39. My dialogue with Martin Palmer, December 2018, in Bath, UK.
40. Sustainable Development Goals and Role of Islamic Finance. https://Blogs.Worldbank. Org/Eastasiapacific/Sustainable-Development-Goals-And-Role-Islamic-Finance Abayomi Alawodeahmad Hafiz Abdul Azizana Maria Aviles| February 15, 2018
41. Fachruddin Mangunjaya, & I. Ozdemier. "Sustainability and Communities of Faith: Islam and Environmentalism In Indonesia". In: Indrawan, M. (Ed) *Civic Engagement in Asia: Stories of Transformative Learning in the Work for a Sustainable Future* (Jakarta: Yayasan Obor Indonesia (in Press), 2020).

Zakat, Infaq, Sadaqah, and *Waqf* (ZISWAF) have the potential to achieve SDGs targets. These funds have not received adequate attention from the government or from Muslim communities. Scholars should highlight the benefits of Zakat, Infaq, Sadaqah, and *Waqf*, which eradicate poverty and fight illiteracy. In 2015, the Indonesian Ulema Council (MUI) issued MUI Fatwa No. 001/MUNAS-IX/MUI/2015 concerning the Utilization of Zakat, Infaq, Sadaqah, and *Waqf* Assets for the Construction of Clean Water and Sanitation Facilities for the Community. This fatwa provides certainty that the benefits of ZISWAF can be used to eradicate poverty, maintain sanitation, uphold the right to obtain clean water and preserve a decent environment. This scheme achieves goal 6 of the UN SDGs: clean water and sanitation.

Accordingly, ZISWAF, for Muslims, has the essential goals of eradicating poverty and hunger (SDGs 1 and 2), achieving health and well-being (SDG 3), and improving education (SDG 4). Conservation areas are occupied by many inhabitants, some of whom are powerless. They must therefore be empowered to fight poverty. For example, communities living near forests can be empowered to reduce pressure on natural resources by direct use of ZISWAF funds. Dompet Dhuafa empowers the community around Ujung Kulon National Park by providing capital for processing forest honey using a sustainable forest products approach. Some farmer groups that were previously recipients of zakat were able to give zakat after 3-4 years of coaching.[42]

Sustainable Green City

On a trip to Trengganu in 2017, the author encountered an environmental activist from Hong Kong. As a teacher, he expected to bestow the knowledge of nature onto his students in Trengganu, Malaysia. Hong Kong has little remaining land, so it is difficult to introduce future generations to nature. He believed that the students must know and care about the water's cleanness and high mineral content, the pure oxygen from natural forests, and the lakes or rivers that produce fish. Although supermarkets supply all kinds of imported food, most students probably do not understand where that food comes from. In addition, it is vital to connect human emotions and relations with nature to deliver a nuance of psychology, sentiment, mental health, and perceptive thought. Nature also fosters good mental health.[43]

A civilization is tied to the development of a good city, whose growth provides prospects for its inhabitants. The city must be comfortable, clean and balanced, with an abundance of nature. Islamic tradition shows a development of pleasing methods of integrating nature into its cities. The history of Islamic cities, such as Fez in Morocco, suggests the presence of many parks and abundant water flow. There were also cities with palaces and comfortable and peaceful gardens. This city planning created a discipline that developed under the name of Islamic Garden Design. In these serene gardens, Muslims contemplate and make remembrance of Allah SWT amidst nature, in peace and tranquility. Some Islamic gardens still survive and have the same features as early 7th to 16th-century examples of this art form. [44]

42. The presentation of Imam Rulyawan, Director of Dompet Dhuafa, 8/5/2020. Webinar, "Pemberdayaan;Masyarakat di Sekitar Kawasan Hutan, di tengah Covid19". May 8, 2020, PPI-Unas Ngaji Online-4.
43. To explore the connection between nature and humans, you can read a book on biophilia, which states that humans have an intimate bond with nature and are connected with other forms of life. Kellert, S.R. & EO Wilson. *Biophilia Hypothesis* (Washington,DC: Island Press, 1984).
44. See, "Creating Islamic Garden," https://www.gardeningknowhow.com/special/ spaces/creating-islamic-gardens.htm

Box 5.2

Zero Emissions of Masdar City

Masdar City is eco-friendly with zero emissions (Source: TranssolarEnergietechnik GmbH)

The passion for building a model of an environmentally friendly city in a Muslim country has been realized by the United Arab Emirates (UAE). It is the first city in the world to be carbon-neutral, waste free and car- free.

Masdar city is located not far from Abu Dhabi. The city will host a population of 40,000 residents and 50,000 daily commuters.

The city is under construction. It is expected to become a clean technology cluster and home to 1,500 visionary companies and research centers.

In 2009 Masdar Institute of Science and Technology was built in the city to accommodate 100 students. Cars are prohibited from operating in the city.
Transit will consist of mass public transportation and rapid transit systems such as rail lines connecting commuters to other locations outside the city. Walls to keep out the hot desert wind will also be built.

The lack of motorized vehicles (cars) will allow the narrow streets to be shaded, increasing air circulation and reducing demand for air conditioning. The city will be oriented northeast to minimize the direct sunlight hitting the sides and windows of the buildings. Solar panels on the roofs of buildings and other places will generate enough electricity to meet most of the city's electricity needs. Water will be provided through a solar-powered desalination plant.

The landscape within the city and trees planted outside the city will be irrigated by the water and wastewater produced locally. Masdar City was chosen to host the newly established International Renewable Energy Agency (IRENA). This is Abu Dhabi's achievement and marks the first time an Arab city has hosted the headquarters of an international organization.[1]

At Masdar, a renewable energy project is being developed that will provide commercial supplies for the Middle East and North Africa (MENA) as well as international markets. The city is also developing clean technology innovations and is expected to be the most sustainable city in the world.[2]

1. GHG Emissions: Mitigation Efforts in the Arab Countries http://www.afedonline.org/ afedreport09/english/Char2.pdf
2. https://masdar.ae/en/about-us/management/about-masdar

In the 21st century, the United Nations has launched a city and biodiversity program, or urban biodiversity program. In large cities around the world there are always high-rise office buildings and large apartment blocks. Leaving space for gardens has almost been forgotten. Likewise, apartment buildings soar to the sky. And every day cars pass by and emit smoke, polluting the air. It is not easy to find land that can be planted with trees, to preserve the balance of nature. How can we promote biodiversity without land? To adapt to the 21st century, living plants have been planted over the walls of entire buildings. Such arrangement is called biophilic designs.[45] Cities should also be encouraged to use renewable energy with zero emissions. That can only be possible with proper planning and a suitable financial scheme.

Figure 5.3: Nur Sultan Green City, Khazakstan, Green City award winner for OIC Member States 2019

45. "Biophilic Design," adalah sebuah desain yang membawa kesan alam dapat berdekatan dengan manusia. Lihat, Kellert, S.R. 2005. *Building for Life. Designing and Understanding the Human – Nature Connection*. (Washington DC: Island Press, 2005)

In 2017, to promote efforts towards sustainable urban planning OIC countries announced the Islamic Green City Excellence Award, which was assessed based on the following criteria:[46]

1. Clean, Sustainable and Smart Transport;
2. Smart Green Buildings;
3. Sustainable Energy Use and Conservation;
4. Water and Wastewater Management and Recycling;
5. Waste Management and Recycling;
6. Sustainable Land Management and Urban Forestry;
7. Ambient Air Quality and Acoustic Environment;
8. Conservation of Nature and Biodiversity;
9. Mitigation and Adaptation to Climate Change.

In 2019, Nur Sultan, the Capital of Kazakhstan, was chosen as a green city. Nur Sultan is a city with a beautiful design and modern architecture on the banks of the Ishim River, which flows from Kazakhstan to Russia. The city is located in Central Asia and has a population of over 1 million Twenty-first century cities are full of high-rise buildings. Therefore, innovation is needed so that humans do not forget the natural elements in their lives as a *Fitrah*. Thus, the idea of growing plants on roofs and creating living walls on the sides of buildings adds to a city's beauty and biodiversity.

Many cities are now designed in an environmentally friendly manner by encouraging city residents to enjoy planting. In Indonesia, since 2014, the concept of *Indonesia Berkebun* (Gardening Indonesia), or urban farming (http://indonesiaberkebun.org), has been taken up extensively. In urban areas, individuals have been encouraged to utilize small strips of land to create gardens in their respective communities.

Parks in urban areas should also sustain urban ecosystems, to support dense populations. Parks provide space for education as well as for urban social structure. Urban spatial planning recommends that 30 percent of the city should be treated as a natural area or urban forest. Cities play an important role in conserving global biodiversity, mainly through the planning and managing of urban green spaces. This concept is indeed not easy to implement. Still, efforts to maintain the balance of nature in a city are necessary, as it is intrinsic to the mental and physical health of the city's residents.

46. "Islamic Green City Excellence Award Guide" (availabel at: http://www.ksaaem.org/en/wp- content/uploads/sites/2/2018/03/Guidelines-Green-Cities.pdf diaskes, 31 Mei 2020)

Chapter 6
Akhlaq, Climate Crisis and Covid- 19

Verily, the greatest lesson in Islam is Akhlaq. If you do not have Akhlaq of Islam, then what lessons have you learned from Islam? (Sheikh Ali Tantawi)

Introduction

Prophet Muhammad SAW urged us to live justly and prevent evil and deterioration. The ongoing climate crisis is a worrying point for the existence of human civilization; damage to the earth could occur on a massive scale and across the globe. Climate damage is therefore the true evil in this modern age.[1] It is widely known that this earth is like a boat carrying all humankind. The following hadith illustrates how humans ought to behave during the climate crisis, in particular that we ought to engage in dialogue amongst ourselves in order to overcome it:

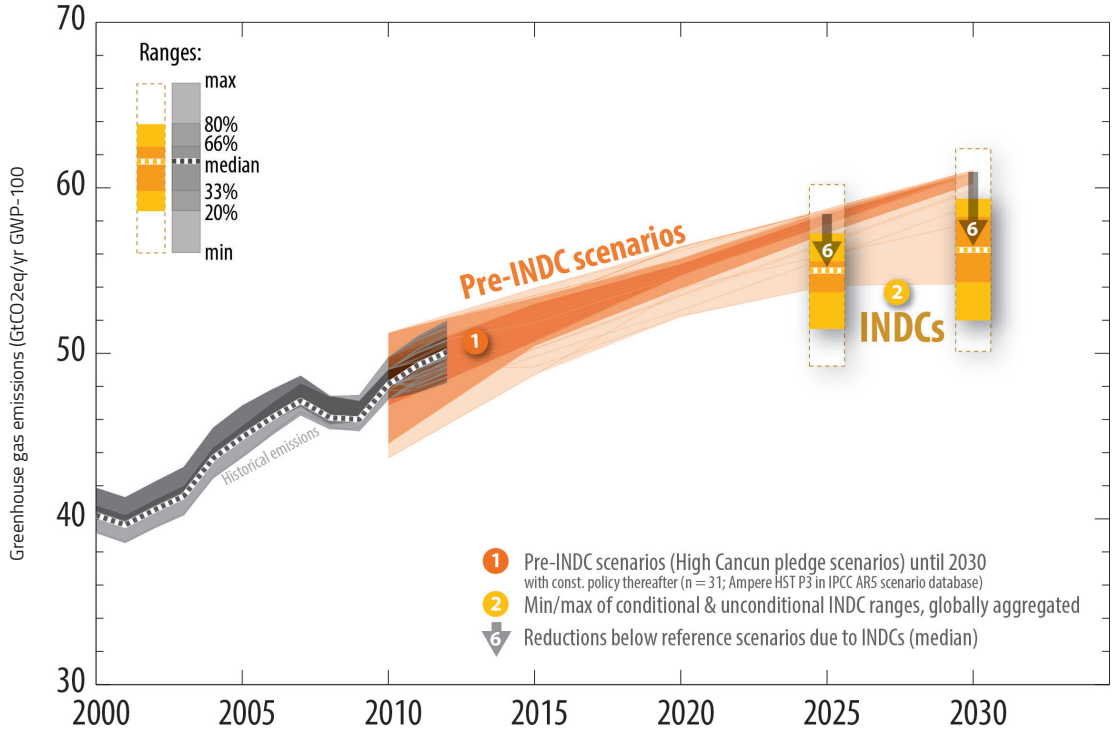


Figure 6.1: Greenhouse Gas Emission Scenario with commitments prior to the Intended Nationally Determined Contribution (INDC). The INDC is a means for governments to communicate internationally the steps they will take to address climate change in their own countries. INDC reflects each country's determination to reduce emissions, taking into account its domestic circumstances and capabilities. (pbl.nl)

1. From Abu Sa›id Al Khudry (*radhiyallahu 'anhu*), who said: I heard the Messenger of Allah *sallallaahu 'alaihi wa sallam* said, "Whosoever of you sees an evil, let him change it with his hand; and if he is not able to do so, then [let him change it] with his tongue; and if he is not able to do so, then with his heart — and that is the weakest of faith." (Hadith by Muslim No. 49)

> "The example of the person abiding by Allah's order and restrictions in comparison to those who violate them is like the example of those persons who drew lots for their seats in a boat. Some of them got seats in the upper part, and the others in the lower. When the latter needed water, they had to go up to bring water (and that troubled the upper deck passengers), so they said, 'Let us make a hole in our share of the ship (and get water) so that we do not trouble the upper deck passengers.' If the people in the upper part left the lower deck passengers to do what they had suggested; then all the passengers of the boat would have perished, but if they had prevented them, then both parties would be safe." (Hadith by Bukhari No. 2493).

Dialogue about the Earth's climate began in the 1990s. All nations realized that the climate crisis will destroy human civilization. Both developed and developing countries have contributed to the emission of greenhouse gases which affect the Earth's balance. The issues of climate change and the reduction of emissions involve us all. Dialogue is held each year on how to prevent the climate crisis, and scientists have carried out intense studies and scientific reporting on the matter.

As developed and rich countries possess advanced science and technology and generally have more authority, they should support less developed countries. Countries in the global north should share their knowledge, resources, and funding. Developed countries, such as the United States of America, which possess the advanced technology expected to provide the solution, bear a moral burden. They can enact adequate policies without reducing their prosperity in the slightest.[2]

Developing countries, such as Indonesia, can prevent the planet's 'boat leaks' by preventing deforestation and forest fires. That is because the forest is a climate regulator, a carbon dioxide binder, and a carbon sink which is needed in order to reduce greenhouse gases (GHG). Forests save ecosystems and safeguard species diversity for the benefit of future generations. The Indonesian government's efforts to protect forests from forest fires have paid off. At the 13th COP in Bali in 2007, it was determined that the best and cheapest way to combat climate change is to prevent forest damage. The REDD+ (Reducing Emissions from Deforestation and Forest Degradation in Developing Countries) platform was created to assist developing countries to that end. To achieve that aim, the Indonesian government implemented a moratorium (stopping forest logging), carrying out a massive program to prevent emissions that continue to thicken the atmosphere. Several policies have been issued, including the moratorium, the dedication of customary forests to indigenous peoples, and the establishment of the Peat Restoration Agency (BRG) in 2016. Establishing that agency was a strategic step because peatland fires are responsible for high emissions of GHGs. In 2020, Indonesia received foreign aid from Norway worth Rp812 billion or 530 million NOK to reduce emissions.[3]

2. Walter Sinnott-Amstrong, "It's Not My Fault: Global Warming and Individual Obligation," in SM Gardiner, *et al. Climate Ethics, Essential Readings* (Oxford University Press 2010), hlm. 333.
3. https://en.antaranews.com/news/151822/norway-to-pay-rp812-billion-for-gas-emission- reduction-in-indonesia.

This is undoubtedly the result of successful, measurable, and accountable government and community action. However, considering the remaining challenges that still face the preservation of forest land, such as widespread clearing of land for oil palm plantations, Indonesia faces a moral dilemma when it comes to conserving the earth.[4]

All countries must share resources and must not prioritize their egos or interests. There is only one Earth, and all human beings and nations are passengers in it. International collaboration prevents those that will make a 'hole in the boat,' causing this 'boat' (the planet) to sink.

In his book entitled *Ratusan Bangsa Merusak Satu Bum*i, Emil Salim describes that all nations have destroyed the Earth for 200 years, since the industrial revolution.[5] Since then, every nation has relied heavily on energy derived from fossil fuels (petroleum and coal) which thicken the earth's atmosphere with greenhouse gas emissions. Every nation must correct its contribution to the damage that has caused. They must reinforce their commitment to switch to more environmentally friendly energy (renewable energy) as an alternative.

The Qur'an and *Sunnah* guide the daily lives of Muslims, who are instructed to imitate Prophet Muhammad's actions and best behavior. The Prophet is 'the living Quran,' a living guide on the practice of the Qur'an. The discussion of Islamic ethics in life always includes the Qur'anic dimensions covering the attitudes and life (*Sunnah*) of the Prophet SAW. In Islam, ethics cannot be separated from religion, on which ethical principles are built. Islamic ethics, and the understanding of the meaning of objects and their essence, is therefore built on metaphysical principles. In this case, Allah SWT said on the Qur'an:

> "Allah created not the heavens and the earth and all that is between them except with truth" (QS. Al Hijr (15):85) And "Allah created not the heaven and the earth and all that is between them in vain" (QS. 38:27).

As explained in Chapter 2, ethics is a common language used in the study or standard of philosophy. In Islamic *tamaddun*, ethics is translated into practical ethics, meaning *adab*. *Adab* includes etiquette towards Allah and towards our fellow creatures. In this manner, Islamic tradition covers matters related to ethics in the context of attitude or etiquette, such as the etiquette of praying, the etiquette of dressing, the etiquette of performing ablution, the etiquette of visiting, the etiquette of associating with fellow human beings, even the etiquette of associating with other creatures.

4. Hans Nicholas Jong. 2020 Indonesia to receive $56m payment from Norway for reducing deforestation.. https://news.mongabay.com/2020/05/indonesia-norway-redd-payment- deforestation-carbon-emission-climate-change/ (retrieved, July 30, 2020)
5. Emil Salim, *Ratusan Bangsa Merusak Satu Bum*i (Jakarta: Kompas, 2010)

Adab includes all good deeds and actions carried out individually or collectively, which are regulated based on the knowledge of the Qur'an. Meanwhile, ethics in general also involves the positive habits of a routine, called *adab*. In Islam, the source of *adab* is the Qur'an, derived from the *Sunnah*. So, Abdul Aziz bin Fathi as-Sayyid Nada (2008) wrote the book *Mausû'ah al Adâb al Islamiyyah al Murattabah 'alâ al Hurūf al Hijaniyyah*, translated as The Encyclopedia of Islamic Ethics. The text contains rules of daily interaction, from when Muslims wake up to when they socialize with others, to the everyday the ethics of wills.[6]

In reality, people usually confuse the term ethics, which covers goodness, with the term morals. Morals are related to positive human actions and non-destructive behavior. In Islam that is called *Akhlaq*. In the context of the climate, one moral problem is the negative attitude of humans toward Planet Earth. Al Gore calls this a moral problem. Human behaviors that pollute the air, thicken the atmosphere with GHGs, cut down forests, and eliminate the earth's balance have led the planet to a tipping point. These changes are difficult to reverse and threaten future generations.

The moral guidelines of Muslims are the *Sunnah* and *Akhlaq* of Prophet Muhammad, as commanded in the Qur'an. Hence, Our Prophet is certainly on the most exalted standard of moral excellence (QS. 68:4).

This book examines moral values and ethics related to human behavior towards the environment and its underlying principles. Parvez Manzoor articulates the philosophical principles of Islamic environmental ethics related to *Tawhid*, *khilafa*, *amanah* (responsible and trustworthy), *sharia* (ethics of action), and *Adl* and *I'tidal* (justice and enforcement).[7]

Tawhid is the principle of the oneness of Allah. It is connected to the central teachings of Islam, the faith. *Tawhid* denotes faith only in Allah; everything related to divinity comes from the One and Only Allah. This ethical foundation of monotheism underlies economic, social, and ecological principles. Because it is based on the knowledge of the One Allah who creates and becomes the guiding principle, the unity cannot be separated and must be viewed holistically.
Manzoor wrote the following on Islamic ethics:

> "In the context of Muslim ethics, the *Tawhid* concept is indispensable. *Tawhid*, being the basis for the recognition of Allah, reminds us of the ultimate goal for every human effort in dealing with ecological, economic, or technical problems. Purification of intentions should be done because *Tawhid* is a process of Islamization demanding human nature to be under moral control; nature and ethics are integrated. There should be a unity of intentions, actions, wills, goals, and means."[8]

6. Abdul 'Aziz bin Fathi as Sayyid Nada "Mausû›ah al Adâb al Islamiyyah al Murattabah ‹alâ al Hurūf al Hijaniyyah," *Ensiklopedia Etika Islam*. (Diterjemahkan oleh: Muhammad Isnaini dkk) (Jakarta: Maghfirah Pustaka, 2008).
7. P.S., Manzoor, "Environmental and Values: the Islamic Perspective," in: Z. Sardar, *The Touch of Midas* (Mapusa,India: Other India Press. 1984) p.150-169.
8. *Ibid*.

Box 6.1

When the Istisqa Prayer is Accepted

The dimensions of effort and prayer in Islam are entangled. Prophet Muhammad recommended that we tie the camel, tie it up in certainty, and then trust Allah SWT. So, there is effort and submission (taqwa) to Allah SWT. In every extraordinary situation, such as a long drought, prayer is sent to Allah, Who is All-Encompassing all affairs.

During a long dry season in Sumatra, the Istisqa Prayer was held in Pekanbaru. They prayed that Allah would send rain, Alhamdullilah. The prayer was answered. Read the following news:

"Heavy rains finally hit Pekanbaru, causing the haze from the remaining forest and land fires that had enveloped the area to disappear gradually. The rain that fell for a long time was greeted with joy by the people of Pekanbaru" (See Figure 6.2).

"Alhamdulillah, it rained during the Istisqa prayer," wrote a Pekanbaru resident, Icoet Mannessa who also shared a photo of the conditions of the Istisqa prayer carried out by residents of Tanah Merah, Pekanbaru, Riau on Facebook (27/10/2015).

Environmental activist Fachruddin Mangunjaya also commented on the photo that Icoet Mannasse shared: "Their prayers were answered instantly; the Istisqa prayer was mustajabah. So which of Allah's favors do you deny #Muslim4Climate." This columnist writes essays and books on the environment and Islam.

MAJELIS ULAMA INDONESIA

WADAH MUSYAWARAH PARA ULAMA ZU'AMA DAN CENDEKIAWAN MUSLIM

TADZKIRAH

Nomor: TAD-468/MUI/X/2015

Mengingat kondisi perubahan iklim dan pemanasan global di sebagian besar wilayah Republik Indonesia yang mengalami kekeringan berkepanjangan sehingga berdampak pada gagal panen, krisis air bersih, dsb, maka Dewan Pimpinan Majelis Ulama Indonesia menyerukan kepada umat Islam di Indonesia untuk:

1. Bertaubat dan memohon ampun kepada Allah 'Azza wa Jalla dari segala macam maksiat (at-taubah min al-ma'ashi), meninggalkan perilaku dzalim (al-khuruj min al-madhalim), memperbanyak sedekah (iktsar as-shadaqah), dan meninggalkan permusuhan (mushalahah al-a'daa'). Karena kekeringan berkepanjangan yang melanda negeri ini bisa jadi merupakan peringatan dari Allah SWT atas perbuatan kita, sebagaimana Firman Allah SWT dan sabda Rasulullah SAW:

   "Telah nampak kerusakan di darat dan di laut disebabkan karena perbuatan tangan manusia, supay Allah merasakan kepada mereka sebahagian dari (akibat) perbuatan mereka, agar mereka kembali (ke jalan yang benar)". (QS. Ar-Rum: 41)

   "Tidaklah mereka mengurangi takaran dan timbangan kecuali akan ditimpa paceklik, susahnya penghidupan dan kezaliman penguasa atas mereka. Dan tidaklah mereka menahan zakat (tidak membayarkannya) kecuali hujan dari langit akan ditahan dari mereka (hujan tidak turun), dan sekiranya bukan karena hewan-hewan, niscaya manusia tidak akan diberi hujan". (HR. Ibnu Majah dan Al-Hakim)."

2. Melaksanakan shalat memohon hujan (shalat al-istisqa), dengan didahului puasa selama tiga hari, memperbanyak istighfar, berperilaku sopan santun, dan berkehidupan sederhana, serta memohon doa pada para shalihin, sesuai yang dilakukan oleh Rasulullah SAW dan para Sahabat:

"Dari Ibnu Abbas Radhiyallaahu 'anhuma berkata: Nabi SAW keluar dengan tawadhu', berpakaian sederhana, khusyu', tenang, berdoa kepada Allah, lalu beliau shalat dua rakaat seperti pada shalat hari raya, beliau tidak berkhutbah seperti khutbahmu ini" (HR. Ahmad, Abu Dawud, at-Tirmidzi, an-Nasai, dan Ibnu Majah).

"Dari Anas Ibnu Malik ra, sesungguhnya Umar ibnu al-Khattab ra ketika dilanda kekeringan dia meminta doa memohon hujan kepada Abbas bin Abdul Muthallib, ia berdoa: Ya Allah, kami dahulu pernah meminta hujan kepada-Mu dengan perantaraan Nabi kami kemudian Engkau menurunkan hujan kepada kami. Maka sekarang kami memohon kepada-Mu dengan perantaraan paman Nabi kami, maka turunkanlah hujan untuk kami". Anas ra. berkata: kemudian turunlah hujan" (HR. Al-Bukhari)

3. Menyerukan kepada pemerintah untuk mengambil kebijakan tegas dan strategis yang berimplikasi pada upaya penghentian, atau setidaknya pengurangan, dari berbagai dampak buruk kemarau panjang, antara lain dengan menegakkan hukum yang menjerakan kepada setiap pelaku pembakaran dan pemilik lahan yang menyebabkan bencana asap, melancarkan kebijakan ekonomi yang pro rakyat kecil yang semakin berat akibat dampak buruk kemarau panjang, dsb.

Wallahu al-Musta'an, wa Ilaihi at-Tuklan.

Jakarta, 20 Oktober 2015

DEWAN PIMPINAN
MAJELIS ULAMA INDONESIA

Ketua Umum, [illegible]

DR. KH. MA'RUF AMIN DR. H. ANWAR ABBAS, MM, MA

Figure 6.2: In 2015, Muslims in Pekanbaru Riau, praying istisqa, i.e. praying for rain, after experiencing a long drought (Photo: © Facebook.com)

The residents of Riau genuinely hoped for heavy rain, especially since the smoke from the forest fires disturbed the residents' activities. The economy was paralyzed, schools were closed, and as many as 90,465 Riau residents fell ill due to exposure to smoke.

A week prior, it had rained in Riau, but the smog returned to dense due to lack of rainfall. "Hopefully, the smoke will be gone tomorrow," Gusman, a Pekanbaru resident, stated as quoted from Tiraskita.com.

On Tuesday evening, the torrential downpour in the Pekanbaru City area had dispelled the smog that enveloped Sultan Syarif Kasim II International Airport. "The brief heavy rain, at around 05.40 p.m., made the visibility of Sultan Syarif Kasim Airport improve," said Airport Duty Manager Sultan Syarif Kasim II International Airport, Ongah *Hasn*an Siregar in Pekanbaru.

Ongah said that the clearing up of the sky improved the airport's visibility from 1,000 meters at 18.00 WIB to 2,000 meters at 18.30 WIB. At least four of the five planes affiliates with three airlines, Silk Air, Lion Air, and Batik Air, managed to land and take off.

Previously, the Indonesian Ulema Council (MUI) appealed to Muslims to carry out the Istisqa prayer. MUI also called upon the Indonesian government to take firm action against the perpetrators of forest fires causing the haze disaster (Marwan Aziz) quoted from: Berita Lingkungan 28/10/2015 http://www.beritalingkungan.com/2015/10/ ketika-shalat- istisqa-diijabah.html

The primary concern of the Qur'an is human behavior[9]. Belief in one Allah and in human accountability play an essential role, which is very tightly controlled. For a Muslim, living in the world is a journey and a test; Allah SWT sees his creatures being tested under various circumstances and wants to see how humans will act (Surah Al Mulk, 67:2). In the cosmic drama, in Chapter 1, Allah declared that the Earth is His creation, entrusted to humans to care for and protect so that it will prosper. Allah sent Adam, who knew how to administer the Earth (Al Baqarah, 2:30). Furthermore, humanity bore that trust (Surah Al Ahzab 33:72).

Humans were given intellect (*Akhlaq*) to reason, analyze, retain knowledge, categorize and collect data, design, provide concepts, and organize life. Allah also created man in the best mold (Surah At Tin, 95:4). In carrying out this mandate, ethics (*adab*) and morals (*Akhlaq*) are needed to deal with and live with the rest of Allah's creatures.

The Moral Storm

In international dialogues, there is always a fierce debate regarding who should reduce the impact of the climate crisis. Developed countries and developing countries bear different and distinct responsibilities. In every dialogue about reducing emissions to tackle the climate crisis, the term "common but differentiated responsibilities" (CBDR) is often raised to indicate that nations have the same purpose, but must act in different capacities.

Indonesia has committed to reducing emissions by 29 percent independently, and by 45 percent if it receives assistance from developed countries. This commitment was made at the Paris Agreement 2015.

Almost all signatory countries have supported the Paris Agreement. That propelled positive energy toward taking action to tackle climate change. Unfortunately, in 2016, the United States backed away from its essential treaty commitments due to a leadership change. Nevertheless, optimism should be maintained. Ethically, the American government has lost its morals. In the context of climate change, Stephen Gardiner states that, "Climate change is the perfect moral storm." This is due to the damage it causes, coupled with the human neglect and indifference to the impact it has caused.

Not everyone feels the actual damage from caused by the climate crisis. This is similar to Covid-19, which spread widely throughout the world, but many still do not believe that the virus exists. Updated reports on deaths and records of Covid-19 transmission continue to increase. Those who do not believe the virus exists will be awakened when they see hospitals filled with many sick patients. In 2018 and 2019, the United States was hit by severe droughts and fires. In 2018, forest fires occurred on various continents. The breakout of forest fires in the Northern Arctic Circle in Scandinavia, on the Russia-Finland border near the Barents Sea, was a rare event. The largest fires in history also occurred in British Columbia and in California. Britain has also been hit by a record number of wildfires in a single year.

9. Fazlur Rahman, Islam dan Modernitas (Bandung: Penerbit Pustaka Bandung, 1985), page. 15.

Greece experienced the de*Adl*iest forest fire in its history, which killed 102 people. The most tragic forest fires in the history of human civilization occurred on the Australian continent. 511 sq km of land were burned, and 3 billion plants and animals were killed. 143 million mammals, 2.46 billion reptiles, 180 million birds, and 51 million frogs perished.[10]

10 Mengutip laporan, WWF Australia. 2020. Australia's 2019-2020 Bushfires: The Wildlife Toll. WWF. https://www.wwf.org.au/news/news/2020/3-billion-animals-impacted-by-australia- bushfire-crisis#gs.c23ddz Retrieved August 30, 2020.

It is unimaginable to live harmoniously with other creatures if we do not understand that Allah created humans and other beings (sentient beings). Those other beings are closely related to humanity's interests and to our very existence. Earth, which humans have been entrusted to care for, was created long before humans existed.

Human knowledge records that the Earth is 4.5 billion years old, while human civilization emerged 10 thousand years ago. Famous civilizations include the Mesopotamian, the Babylonian, and the Egyptian. Human civilization is at its peak in the modern era.[11] This height of civilization has burdened the Earth due to the accelerated exploitation and depletion of natural resources. Such a burden has become a threat to the survival of living creatures. Humans never seem to be satisfied with their technological advances, and they cannot contain their lust for pursuing 'progress.'

Planet Earth was created wholly to support life, with its uniqueness and the presence of other creatures apart from humans. In the world of fauna, insects account for two thirds of the earth's species. In the flora world, there are flowering plants (Angiospermae) and naked seed plants (Gymnosperms). The lives of these "fauna and flora" constitute a support system on earth. They are present and interact with each other to create an ecosystem.

In the modern era, those ecosystems face pressure from human behavior – humans have not upheld their responsibility to care for and preserve the earth and its inhabitants. Such irresponsibility and negligence is caused by humanity's failure to understand or their willingness to ignore nature's limitations and carrying capacity.

It is impossible to understand the Qur'an as a guide without knowing the nature of Allah's creation. Prophet Muhammad SAW was attached to nature. He liked being outdoors and secluded in Hira Cave, Jabal Nur. Out in the open, besides enjoying and contemplating Allah's creation, you can also feel the majesty of that creation.
Fazlun Khalid[12] suggested apprehending the natural state of Allah's creation to obtain deeper knowledge, so that Allah's mandate might be carried out properly. This concept is called the science of creation (*Ilm al-khalq*), which the Qur'an uses to explain the natural surroundings and the entire universe. According to Khalid, by analyzing the root word of *kha-la-qa*, there are around 261 verses related to Allah's creation in the Qur'an. The words take various grammatical forms, from the roots *kh*, *la* and *qa*.

10. Mengutip laporan, WWF Australia. 2020. Australia's 2019-2020 Bushfires: The Wildlife Toll. WWF. https://www.wwf.org.au/news/news/2020/3-billion-animals-impacted-by-australia- bushfire-crisis#gs.c23ddz Retrieved August 30, 2020.
11. The debate on the most advanced modern human civilization can be navigated from various viewpoints. But looking at the progress of human culture in terms of globalization, the 21st century is the pinnacle of modern human civilization. See Michael Shermer, "No, There Wasn't an Advanced Civilization 12,000 Years Ago. Did an advanced civilization disappear more than 12,000 years ago?" on June 1, 2017. https://www.scientificamerican.com/article/no-there-wasnt- an-advanced-civilization-12-000-years-ago/.
12. E A Posner & D. Weisbach, *Climate Change Justice* (Princeton Univ Press, 2010), p.15

Likewise, the first revelation of the Qur'an contains the verb khalaq (to create), which is derived from this root. This surah is an invitation for us to read: "Recite in the name of your Lord Who created" (QS. 96:1). The above statement implies that we bear part of the overall responsibility for Allah's creation process. The Qur'an, which manifests this totality, is a guide to life for humankind.

Earth is part of a large universe. It is only one planet among others in our solar system. It dynamically rotates around a single star called the sun. Earth is a habitable planet. No other planets have been found like Earth which have sufficient air, water, plant and animal communities, and suitable minerals and planetary systems on which to live.

JIZ Al-Jayyousi Model

Muslim scientists explored Islamic teachings closely related to the abovementioned terminology at a time when Islamic civilization developed and provided enlightenment. Prof. Al Jayyousi, a professor atthe Arabian Gulf University who focuses on Sustainable Development in the Islamic World, proposed a conceptual model covering three formulas for tackling climate change and sustainability: green activism (*Jihad*), green innovation (*Ijtihad*), and green lifestyle (*Zuhud*).

Al Jayyousi stated that Green *Jihad* refers to the steps taken to uphold justice and prevent the imbalances that disrupt the natural state of Allah's creation.

The Muslim community is asked to focus on maintaining nature's balance by acting as an intermediary (*ummah wasat*) to prevent damage. That is the green *Jihad*. "... The key role of the *ummah* is to ensure justice, beauty, and balance in the universe through exercising stewardship and being a *khalifah* (trustee)."

Environmental activists are essential in this sphere. They act to revolutionize knowledge, especially for the younger generation, so that they become aware of the importance of caring for and protecting the environment. This consists of carrying out Green *Jihad*, by compiling all the principles of justice (*Adl*), beauty (*hasn*), protection of social and human resources (*arham*) and protection of our natural capital to support sustainability (*amartu al ard*). This motivation can be based on the spirit of values in the Qur'an, which explains that "the seven heavens, the earth, and all that is within them give glory to Him. There is nothing but gives glory to Him with His praise,49 though you do not understand their hymns of praise." (QS, 17:44). According to the Quran, all existing species are *ummah*, just like humans. Therefore, caution and respect are needed for the *ummah* of Allah.

In addressing the climate and the environment, green Innovation (*Ijtihad*) is carried out by responding to the imbalance and ongoing damage on earth. Innovation is the answer. It should be understood that the main culprit of the damage to the earth's atmosphere is pollution caused by greenhouse gases.

The concentration of greenhouse gases in the atmosphere in the pre-industrial period was equivalent to 300 ppmv. The ideal concentration of greenhouse gases in the atmosphere, that which is considered the safest, is 350 ppmv. That was the level of carbon gas concentration in the period before the 1990s. The high concentration of GHGs goes hand in hand with the increase in global heat (temperature), resulting in an imbalance in the Earth's finely tuned system.

Innovation is essential to reduce emissions and restore the Earth's balance. Innovative efforts involve three aspects. First, individual concern. This can be measured by observing the carbon footprint of individuals, measured in grams and tons when using carbon-based modes of transport such as private vehicles. The use of private vehicles emits more carbon emissions than using public transportation, which is a more efficient and cheaper means to travel. An individual's carbon footprint is zero if they reach their destination without using any fuel, for example on foot or by bicycle.

The second effort is to neutralize the emitted carbon by way of offsetting or sequestration, i.e. sequestering carbon through tree planting programs or assisting the development of renewable energy. The latter can be done by developing solar power and other zero-carbon efforts. The third effort is to support policies and innovation to reduce emissions in a sustainable manner.

Lastly, *Zuhud*, a traditional Islamic term which defines a lifestyle that is not attached to the material world. In that sense, it describes humans who do not concern themselves with material things; they do not wish to earn money for the sake of earning money. This attitude also signifies not sacrificing days and nights to schemes that will increase material wealth.

A person who achieves *Zuhud* is able to balance their interests in this world and in the hereafter. Achievement of *Zuhud* means achieving closeness to Allah SWT and being aware of His mandates. A person who achieves *Zuhud* strikes a balance in how they dedicate their time, how they earn and spend their money, and in the deeds (charity) they carry out.

Maulana Rumi explains the qualities of *Zuhud* using an analogy: humans are like boats, and the material world is like water. A boat needs water to sail. If one tried to sail on dry land, they would fail. So, humans need material objects to survive. They need food, money, water, clothes, and houses. All these belong to the material world. The vast ocean, and this world's treasures, are abundant. But we must let the next generation enjoy them in the same quality and quantity. In other words, *Zuhud* is a paradigm for using the Earth's resources in a sustainable manner, i.e. not using more resources than what is needed.

A companion of the Prophet Muhammad SAW, Abu Zar al Ghifari, continuously reminded people not to forget that they were born alone and they will die alone. The treasures humans seek will not go with them.

> "Be humble towards the world, Allah will surely love you. And, be *zahid* to what humans have, humans will surely like you." (Hadith by Ibn Majah).

Zuhud is a modest attitude towards life, not dominated by other people's belongings. This attitude also reinforces self-confidence, closeness to Allah SWT, independence, simplicity, and empathy. A person who practices *Zuhud* will not unlawfully grow their wealth and will not commit corruption to fulfill their needs. With the value of *Zuhud*, their belief in Allah as the provider of sustenance is firm.

Ethical-based Lifestyle

In 2018, the IPCC warned about the Earth's rising temperatures, which are rapidly and continuously increasing. All nations are asked to curb this rise in temperature, which will likely reach 1.5 degrees Celsius, as quickly as possible. The IPCC believes restricting the rise in temperature to 1.5 degrees will save ecosystems and enable sustainability in societies. Therefore, the IPCC warns against allowing temperatures rise by 2 degrees Celsius.

The increase in temperature corresponds to the escalation of released emissions. Consequently, actions to restrict emissions are essential. The IPCC report is based on 6,000 references written by thousands of scientists from various countries.

So far, international greenhouse gas emissions amount on average to 50 gigatons of carbon dioxide per year.[13] This average has increased due to the acceleration of emissions from pre-industrial times to the present. GHG concentration in the 1990s was 350 ppm. In August 2020, when this book was written, CO2 emissions in the atmosphere had reached almost 414ppm. [14]

The IPCC report was published by a team of experts in Icheon, Korea, and became the basis for evaluating the 2015 Paris Agreement. The report highlights the impacts of climate change that can be avoided by limiting global warming to 1.5°C, as opposed to 2°C or more. For example, by 2100, global sea-levels will rise by 10 cm less if global warming reaches 1.5°C compared to 2°C. With a temperature rise of 1.5°C, it is likely that the Arctic Ocean at the North Pole will lose its summer ice cover once every 100 years. However, with a temperature rise of 2°C, the Arctic Ocean's ice would melt each summer and would disappear in a matter of decades.

The threat to coral reefs will decrease by 70-90 percent if global warming is limited to 1.5°C. If warming reaches 2°C, almost all (> 99 percent) coral reefs will be lost.[15]

Until now, the oceans have supplied a continuous source of food. However, loss of coral reefs has resulted in the loss of the oceans' food sources. It is conceivable that Indonesia will be affected, as its vast oceans produce millions of fish. Coral reef degradation will affect fishermen's income and will decrease food and nutritional supply to humans.

What type of lifestyle then can be carried forward to pass on the earth's resources to our children and grandchildren?

13. This CO2 emission report is monitored daily at the Mauna Loa Observatory Hawaii (NOOA) and reported and analyzed by the CO2 website. https://www.co2.earth/ Retrieved August 31, 2020.
14. IPCC. Net Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments. https://www.ipcc.ch/2018/10/08/summary-for-policymakers- of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments
15. World's richest 10 percent produce half of carbon emissions while poorest 3.5 billion account for just a tenth https://www.oxfam.org/en/press-releases/worlds-richest-10-produce- half-carbon-emissions-while-poorest-35-billion-account

Overuse of the earth's limited resources has exceeded the earth's carrying capacity to overcome the damage to nature for which humanity is responsible. To correct the damage, humanity must evaluate both individually and collectively how to live morally and ethically. Modern human life has consumed too many resources, leaving few for our children and grandchildren.

One aspect which must be contemplated before taking action is the question of justice when sharing resources. An Oxfam report states that the world's wealthiest 10 percent produce around half of all emissions. On the other hand, the poorest half of the world's population, 3.5 billion people, are responsible for only 10 percent of carbon emissions. However, those people face the greatest threat from hurricanes, droughts, and other severe weather associated with climate change.[16] That is not fair.

Ninety percent of global emissions are caused by developed and oil-producing countries which have benefited from burning fossil fuels. However, people in developing countries are affected by the thickening of the atmosphere and rising temperatures that cause climate instability.

This is unfair. African countries will lose more and more water, and Bangladesh will experience more monsoons and floods. In short, climate justice has economic, social, and political dimensions.

The lifestyle of modern humans tends to have a greater impact on the earth because of the desire to own and collect the material world, which is very tempting. The strong urge to acquire more, and the feeling of always being lacking, can only be controlled if a person has moral values. Why do modern humans want to acquire more and more material things while others still lack basic necessities?

The principle of sharing is critical. "The world has enough for everyone's needs, but not everyone's greed," said Mahatma Gandhi.

The modern human lifestyle, especially in the West, consumes 1.6 times the resources that Planet Earth is able to provide in a year. The earth's resources will not increase. On the contrary, they will rapidly be depleted because humanity's wasteful use of resources exceeds the earth's carrying capacity. One organization that focuses on balancing the use of resources and measures the ecological footprint of nations and provides input on how to balance the use of natural resources in each country: Any country can use public data on the Global Footprint Network and can access the National Footprint Account online: www.footprintnetwork.org.

Experts are critical of the fact that nations continue to spur economic growth while the Earth's resources are depleted. The emergence of a degrowth economy, i.e. a steady-state economy, gives us an alternative. Some argue, however, that the term is misleading because it only prioritizes economic measurements rather than sustainable growth more generally.

16. https://www.degrowth.info/en/

Box 6.2

Consumption Beyond the Planet's Capacity

Since the dawn of humanity, humans have enjoyed the air, water, comforts, and facilities to promote life. All of that must be shared with all other creatures on the earth. As long as humans remain on Earth and use its resources, they have an environmental footprint. These traces that are left behind become a burden for humanity as long as we remain on Earth.

Globally, humans have exceeded the Earth's biocapacity. Our average rate of consumption is wasteful! It is estimated that humans require 1.6 times Planet Earth's resources if we continue our current rate of consumption (see Chapter 2 of this book).

The Global Footprint Network seeks to raise awareness by counting the number of days in a year and comparing it with the Earth's biocapacity, to check whether our lifestyle has exceeded the Earth's carrying capacity.

Figure of Country Overshoot Days differ based on lifestyle in using Earth's resources. Indonesia's lifestyle is on average modest; the overshoot day was on December 18. The lifestyle of Switzerland is different; its overshoot day was on May 8, 2020

The Earth Overshoot Day is calculated annually by dividing the biocapacity of the planet (the number of ecological resources that the Earth can produce that year) by the ecological footprint of humankind (human demand for that year), multiplied by 365, the number of days in a year:

Planet Biocapacity / Human Ecological Footprint x 365 = Earth Overshoot Day.
You may calculate your ecological footprint using the footprint calculator: http://www.footprintcalculator.org

By using this app, you will find out how many Earths are needed to sustain your current lifestyle.

Many non-governmental organizations have carried out this calculation to raise awareness of and promote an environmentally friendly lifestyle.

We take Switzerland Earth Overshoot Day, for example, using the 2019 edition (with data for 2016): The Ecological Footprint for Switzerland is 4.64 gha per person (in 2016)

Global biocapacity is 1.63 gha per person (in 2016)

Therefore, 4.64 / 1.63 = 2.8 Earths, if everyone lived with the same lifestyle as in Switzerland.

So, we can determine Switzerland's Earth Overshoot Day. 2020 is a leap year, so 366 x (1.63 / 4.64) = the 129th day of the year. The 129th day of 2020 was May 8, Switzerland Overshoot Day. Meanwhile, Indonesia's Earth Overshoot Day was December 18, 2020.

The Global Ecological Footprint and biocapacity metrics are calculated annually in the National Footprint and Biocapacity Accounts. Using UN statistics, these accounts combine the latest data and the latest accounting methodologies (the National Footprint and Biocapacity Accounts 2019 Edition features 2016 data).

Accordingly, we have an overview of global lifestyles. In 2020, due to the pandemic and large-scale temporary lockdowns, use of natural resources was reduced to less than 2007 levels. Global overshoot day was on August 22, 2020.

Source: https://www.overshootday.org/newsroom/past-earth-overshoot-days

On the one hand, the burden on Planet Earth is becoming heavier, and the earth's carrying capacity has been exceeded. On the other hand, poor countries still need space and natural resources to develop their economies, pursue opportunities to improve lives, and achieve a dignified standard of living. Therefore, there must be a transition by which wealthy countries share and even radically scale down their resources, including their energy needs.

Of course, what is expected of a degrowth economy is a planned and just phase of economic contraction for the wealthiest countries, which will eventually reach a steady-state and operate within the biophysical limits of the earth.
The degrowth movement began to penetrate political, economic, research, and policy circles. It can be defined as follows:

> *Degrowth is an idea that critiques the global capitalist system which pursues growth at all costs, causing human exploitation and environmental destruction. The degrowth movement of activists and researchers advocates for societies that prioritize social and ecological well-being instead of corporate profits, over-production, and excess consumption. This requires radical redistribution, reduction in the material size of the global economy, and a shift in common values towards care, solidarity, and autonomy. Degrowth means transforming societies to ensure environmental justice and a good life for all within planetary boundaries.*[17]

Lessons from the Covid-19 Pandemic

Over the last 40 years, human consumption of natural resources has continued to rise. Countries have pursued economic productivity, with growth expected to reach 6-7 percent. However, in reality, it is only 5 percent per year. Looking at the degrowth principle, humans should manage nature with care and be ready to share and limit excessive consumption, especially businesses that depend on natural resources.

There is a lesson to be learned from Covid-19: Following lockdowns in numerous countries, the level of human consumption of the earth's resources decreased sharply. Indonesia underwent a lockdown (Temporary Large-Scale Social Restrictions-PSBB) starting in March 2020, while other countries initiated similar measures a few months before and after.

17. Human consumption of the Earth's resources declined in 2020, https://www.theguardian. Com/environment/2020/aug/21/human-consumption-of-the-earths-resources-declined-in-2020

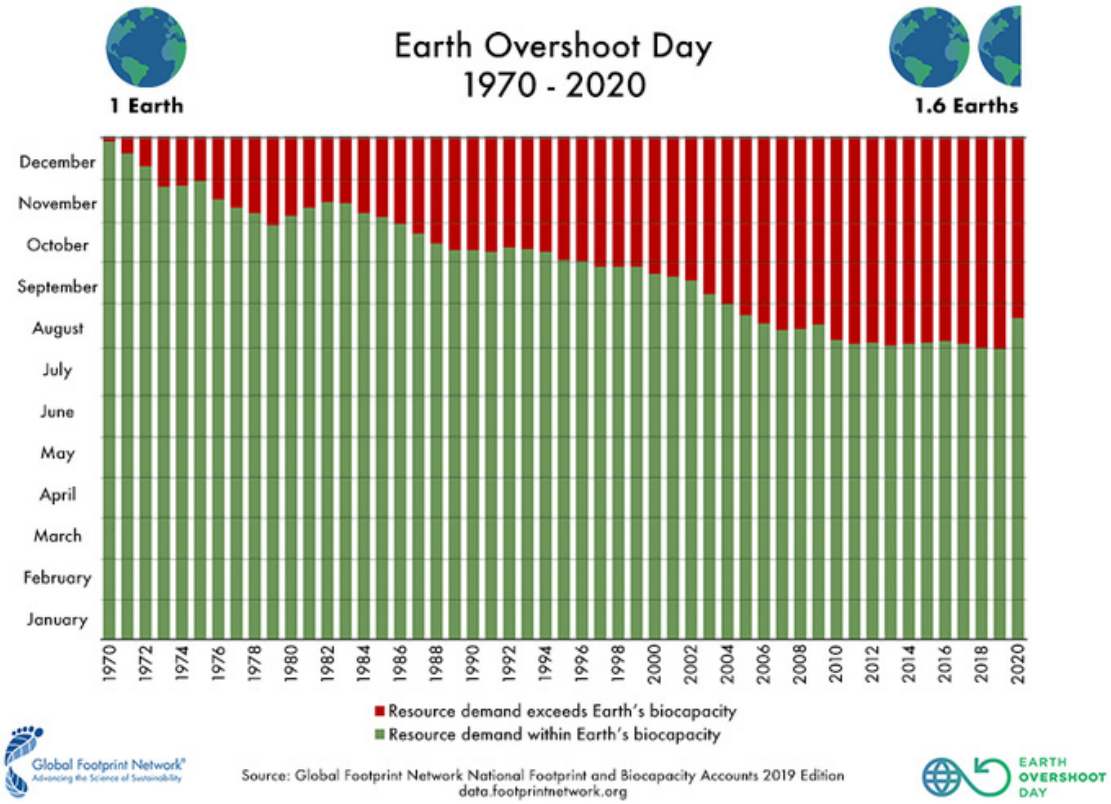


Figure 6.3: Reduction in human activity caused by Covid-19, bringing resource consumption to pre-2006 levels.

The Guardian, a British daily newspaper, reported that as a result of the pandemic, the date at which human consumption will exceed the level nature can regenerate in a year has moved back by over three weeks, from 29 July 2019 to 22 August 2019. Humans' consumption of natural resources returned to pre-2006 levels.[18]

The Global Footprint Network examined the consequences of the Covid-19-induced lockdowns, which led to a 9.3% reduction in humanity's ecological footprint compared to the same period the previous year. Nevertheless, humans would still need the equivalent of 1.6 Earths if they were to keep consuming ecological resources at the current rate. David Lin's research found a major drop in CO2 emissions (down 14.5% compared to the same period the previous year) and in commercial forestry (down 8.4% from 2019).[19]

Mike Childs, of Friends of the Earth, argued that the reduction in our use of natural resources is solely due to Covid-19 and subsequent lockdowns, which reduced economic activity. However, after normal life resumes, consumption will increase again unless we significantly change how we act. Humans can collectively improve their lifestyles and evaluate their actions. If we continue our business as usual approach, the situation is predicted to worsen in the upcoming years.

The concept of the overshoot day is an attempt to slowly travel the steep and challenging path and restore Planet Earth's safe equilibrium. This is following Rostrom's findings, which direct us to return to the safe limits of the nine planetary boundaries that should not be crossed.

18. *Ibid*.
19. David Quammen, *Spillover: Animal Infections and the Next Pandemic* (New York: WW Norton and Coy, 2013)

Covid-19 offers an important lesson for human civilization: nature will turn against humans, and natural diseases will jump in search of new prey because humans have now damaged nature, where they have been safe for millions of years..

David Quammen, the author of *Spillover: Animal Infections and the Next Pandemic*, wrote in the *New York Times*:[20]

> *"We cut the trees; we kill the animals or cage them and send them to markets. We disrupt ecosystems, and we shake viruses loose from their natural hosts. When that happens, they need a new host. Often, we are it."*[21]

This pandemic has become a disaster for humanity; humans should reflect on who we are, why we came into the world, and why death and separation from family, relatives, and the world occurs easily because of a virus that pollutes the air. However, the virus is not a nuclear warhead, but one of Allah's creatures.

According to WHO, 70 percent of infectious diseases in humans in the last 50 years had zoonotic origins. Diseases from most of this group of viruses have emerged like lions ready to pounce on human life. The recorded zoonoses include: Machupo, Bolivia, 1961; Marburg, Germany, 1967; Ebola, Zaire and Sudan, 1976; H.I.V., first recorded in New York and California, 1981; Hantavirus (now known as Sin Nombre), from the southwestern United States, 1993; Hendra, Australia, 1994; bird flu, Hong Kong, 1997; Nipah, in Malaysia, 1998; West Nile virus, New York, 1999; SARS, China, 2002-3; MERS, Saudi Arabia, 2012; Ebola again, West Africa, 2014. And now we have Covid-19 or CoV-2019.[22]

When the Covid-19 pandemic struck, lockdowns had to be implemented, and wild animals and creatures took to the streets. Many media outlets covered this news. When the streets became deserted, alligators from Florida's lakes crawled leisurely down the highways. Seals, wild deer, and wild goats, jackals, badgers, crocodiles, and peacocks came out of hiding and walked or crawled down empty streets. The peak of the lockdown occurred between March and early June 2020.

On a final note, when humans lock themselves in their homes, other inhabitants of Planet eEarth take their place. Without the presence of humans, the air is cleaner, and fewer GHGs are emitted. The exploitation of natural resources stops! It was as if Covid-19 is giving a warning to humans. See! Planet Earth would be better without humans! So, it is not right for humans who share this planet with other creatures to be excessive, arrogant, and destructive. Humans must be humble and fair, and they must do good for all creatures on Planet Earth.

20. David Quammen, https://www.nytimes.com/2020/01/28/opinion/coronavirus-china.html
21. *Ibid*
22. *Ibid*

Epilogue: The Choice is in Our Hands

This book was written under unfavorable circumstances when the Covid-19 pandemic hit the world. A virus that began in Wuhan, China, at the end of December 2019, Covid-19 became a pandemic and spread to 180 countries worldwide.

Man's relationship with nature is being tested. The Scientific Journal of Nature, when publishing the research of Peng Zhou and 26 colleagues in early February 2020, noted that 96% of the 2019-nCoV virus was identical to the gene for the bat coronavirus. In this case, what needs to be watched out for is the trade and consumption of wildlife.[1] In 2007, the Journal of Clinical Microbiology also warned of the possibility of an outbreak of the coronavirus in the human community due to the habit of consuming wild animals such as bats. The journal wrote:

> *"Coronaviruses are well known to undergo genetic recombination, which may lead to new genotypes and outbreaks. The presence of a large reservoir of SARS-CoV-like viruses in horseshoe bats, together with the culture of eating exotic mammals in southern China, is a time bomb. The possibility of the reemergence of SARS and other novel viruses from animals or laboratories and therefore the need for preparedness should not be ignored."*[2]

Transmission of the virus occurs quickly and cannot be stopped, mainly when transportation that bridges continents and countries is not restricted. It is clear that the virus quickly spread in the same direction as the movement of people. Transmission between humans as well as in the air around humans can be the cause.

It has been more than a year since schools and universities closed. The pandemic in Indonesia was announced in March 2020, starting in Jakarta. The government announced the extension of remote learning for school and college students until the new academic year 2020/2021.

***

This book, with all its flaws, presents a way of thinking and acting for us—Muslims—towards the Earth's resources and nature. Several principles in this book base their epistemology on information in and references to the Qur'an, a miracle, in the principles of *Tawhid*, *mizan*, *Fitrah*, *amanah* and others.

This book provides descriptions of the verses of the Qur'an as a written revelation (ayat al-qauliyah) and the created realities, such as water, mountains, trees, animals, etc., as ayat al-kauniyah. As Allah SWT said, the creation of the heavens and the earth is a greater act than the creation of human beings (QS Al Mu'min (40):57). Studying the efforts to improve the environment illustrates how humans carry out their role as the successors of Allah on earth.

1. Zhou, P., Yang, X., Wang, X. et al. 2020. "A pneumonia outbreak associated with a new coronavirus of probable bat origin." *Nature* (2020). https://doi.org/10.1038/s41586-020-2012-7
2. Cheng, V. C., Lau, S. K., Woo, P. C., & Yuen, K. Y. (2007). "Severe acute respiratory syndrome coronavirus as an agent of emerging and reemerging infection." *Clinical Microbiology Review*s, 20(4), p. 660–694. https://doi.org/10.1128/CMR.00023-07

People should reflect on Covid-19 and climate change as two examples of the critical condition facing humanity and the environment due to human activity. Disasters are often called tests, warnings by Allah for humans to return to the right path in managing resources on earth.

The widespread Covid-19 lockdown policies provided an important lesson. When humans minimize their movements to avoid the virus, the air becomes clean, activities that pollute the environment are reduced, and land and air transportation stops. Then, in just a matter of months, the sky clears. Nature seems to be showing its true self after decades of being polluted.

In Bogor, levels of nitrogen dioxide, one of the greenhouse gases harmful to human health and the environment, fell by 7.2% between April and May 2020, compared to the same period in 2019. Overall, however, emissions of greenhouse gases such as CO2, which causes atmospheric thickening, have not decreased.[3]

In the end, climate change has become a scourge that is anticipated to lead to catastrophe if humans do not change their lifestyles. That was mentioned in a United Nations press release, citing the talks of speakers at the United Nations General Assembly, entitled:

"Only 11 Years Left to Prevent Irreversible Damage from Climate Change."

The United Nations General Assembly Chairman said, "We are the last generation that can prevent irreparable damage to our planet." He also warned, in his opening remarks, that "11 years are all that remain to avert catastrophe."[4]
The choice is in our hands.

Wallahu 'a lam

3. Annuri Rossita: Even though the sky looks clear during the pandemic, greenhouse gas emissions are still increasing. See, "The Conversation 2020," https: //theconversation.com/meski-langit-terlihat- bersih-semasa-pandemi-emisi-gas-rumah-kaca-tetap-meingkat-140946.
4. UN General Asembly Speech Seventy-Third Session, High-Level Meeting On Climate and Sustainable Development, 28 March 2019. https://www.un.org/press/en/2019/ga1213

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https://www.youtube.com/watch?v=5yS-m-L4884) dan juga rancanganSustainable Mosque https://www.youtube.com/watch?vr=ReS0cS4XCzM

Appendix 1

Member States of the Organization of Islamic Cooperation

(https://id.wikipedia.org/wiki/Organisasi_Kerja_Sama_Islam)

1. Afghanistan 1969
2. Algeria 1969
3. Chad 1969
4. Guinea 1969
5. Indonesia 1969
6. Iran 1969
7. Kuwait 1969
8. Lebanon 1969
9. Libya 1969
10. Malasya 1969
11. Mali 1969
12. Morocco 1969
13. Mauritania 1969
14. Egypt 1969
15. Niger 1969
16. Pakistan 1969
17. Palestine 1969
18. Saudi Arabia 1969
19. Senegal 1969
20. Sudan 1969
21. Somalia 1969
22. Tunisia 1969
23.T urkey 1969
24. Yemen 1969
25. Jordan 1969
26. Bahrain 1970
27. Oman 1970
28. Qatar 1970
29. Syria 1970
30. United Arab Emirates 1970
31. Sierra Leone 1972
32. Bangladesh 1974
33. Gabon 1974
34. Gambia 1974
35. Guinea-Bissau 1974
36. Uganda 1974
37. Burkina Faso 1975
38. Cameroon 1975
39. Comoros 1976
40. Iraq 1976
41. Maldives 1976
42. Djibouti 1978
43. Benin 1982
44. Brunei Darussalam 1984
45. Nigeria 1986
46. Azerbaijan 1991
47. Albania 1992
48. Kyrgyzstan 1992
49. Tajikistan 1992
50. Turkmenistan 1992
51. Mozambique 1994
52. Kazakhstan 1995
53. Uzbekistan 1995
54. Suriname 1996
55. Togo 1997
56. Guiana 1998
57. Ivory Coast 2001

Appendix 2

Islamic Declaration on Global Climate Change

In the name of Allah, Most Merciful, Most Compassionate

PREAMBLE

1.1 God – Whom we know as Allah – has created the universe in all its diversity, richness and vitality: the stars, the sun and moon, the earth and all its communities of living beings. All these reflect and manifest the boundless glory and mercy of their Creator. All created beings by nature serve and glorify their Maker, all bow to their Lord's will. We human beings are created to serve the Lord of all beings, to work the greatest good we can for all the species, individuals, and generations of God's creatures.

1.2 Our planet has existed for billions of years and climate change in itself is not new. The earth's cli-mate has gone through phases wet and dry, cold and warm, in response to many natural factors. Most of these changes have been gradual, such that the forms and communities of life have adjusted accordingly. There have been catastrophic climate changes that brought about mass extinctions, but over time, life adjusted even to these impacts, flowering anew in the emergence of balanced ecosystems such as those we treasure today. Climate change in the past was also instrumental in laying down immense stores of fossil fuels from which we derive benefits today. Ilronically, our unwise and short-sighted use of these resources is now resulting in the destruction of the very conditions that have made our life on Earth possible.

1.3 The pace of Global climate change today is of a different order of magnitude from the gradual changes that previously occurred throughout the most recent era, the Cenozoic. Moreover, it is human-induced: we have now become a force dominating nature. The epoch in which we live has increasingly been described in geological terms as the Anthropocene, or "Age of Humans". Our species, though selected to be a caretaker or steward (khalīfah) on the earth, has been the cause of such corruption and devastation on it that we are in danger ending life as we know it on our planet. This current rate of climate change cannot be sustained, and the earth's fine equilibrium (mīzān) may soon be lost. As we humans are woven into the fabric of the natural world, its gifts are for us to savour. But the same fossil fuels that helped us achieve most of the prosperity we see today are the main cause of climate change. Excessive pollution from fossil fuels threatens to destroy the gifts bestowed on us by God – gifts such as a functioning climate, healthy air to breathe, regular seasons, and living oceans. But our attitude to these gifts has been shortsighted, and we have abused them. What will future generations say of us, who leave them a degraded planet as our legacy? How will we face our Lord and Creator?

1.4 We note that the Millennium Ecosystem Assessment (UNEP, 2005), backed by over 1300 scientists from 95 countries, found that "overall, people have made greater changes to ecosystems in the last half of the 20th century than at any time in human history... these changes have enhanced human well-being, but have been accompanied by ever increasing degradation (of our environment)."

"Human activity is putting such a strain on the natural functions of the earth that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted."

1.5 Nearly ten years later, and in spite of the numerous conferences that have taken place to try to agree on a successor to the Kyoto Protocol, the overall state of the earth has steadily deteriorated. A study by the Intergovernmental Panel on Climate Change (IPCC) comprising representatives from over 100 nations, published in March 2014, gave five reasons for concern. In summary, they are:

- Ecosystems and human cultures are already at risk from climate change;
- Risks resulting from climate change caused by extreme events such as heat waves, extreme precipitation and coastal flooding are on the rise;
- These risks are unevenly distributed, and are generally greater for the poor and disadvantaged communities of every country, at all levels of development;
- Foreseeable impacts will affect adversely the earth's biodiversity, the goods and services provided by our ecosystems, and our overall global economy;
- The earth's core physical systems themselves are at risk of abrupt and irreversible Changes.

We are driven to conclude from these warnings that there are serious flaws in the way we have used natural resources – the sources of life on Earth. An urgent and radical reappraisal is called for. Humankind cannot afford the slow progress we have seen in all the COP (Conference of Parties – climate change negotiations) processes since the Millennium Ecosystem Assessment was published in 2005, or the present deadlock.

1.6 In the brief period since the Industrial Revolution, humans have consumed much of the non-renewable resources which have taken 250 million years to produce in the earth – all in the name of economic development and human progress. We note with alarm the combined impacts of rising per capita consumption together with the rising human population. We also note with alarm the multi-national scramble now taking place for more fossil fuel deposits under the dissolving ice caps in the arctic regions. We are accelerating our own destruction through these processes.

1.7 Leading climate scientists now believe that a rise of two degrees centigrade in global temperature, which is considered to be the "tipping point", is now very unlikely to be avoided if we continue with business-as-usual; other leading climate scientists consider 1.5 degrees centigrade to be a more likely "tipping point". This is the point considered to be the threshold for catastrophic climate change, which will expose yet more millions of people and countless other creatures to drought, hunger and flooding. The brunt of this will continue to be borne by the poor, as the earth experiences a drastic increase in levels of carbon in the atmosphere brought on in the period since the onset of the industrial revolution.

1.8 It is alarming that in spite of all the warnings and predictions, the successor to the Kyoto Protocol which should have been in place by 2012, has been delayed. It is essential that all countries, especially the more developed nations, increase their efforts and adopt the pro-active approach needed to halt and hopefully eventually reverse the damage being wrought.

WE AFFIRM

2.1 We affirm that Allah is the Lord and Sustainer (Rabb) of all beings:

ٱلْحَمْدُ لِلَّهِ رَبِّ ٱلْعَـٰلَمِينَ

Praise be to Allah, Lord and Sustainer of all beings
Qur'an 1: 1

He is the One Creator – He is Al-Khāliq:

هُوَ ٱللَّهُ ٱلْخَـٰلِقُ ٱلْبَارِئُ ٱلْمُصَوِّرُ

He is Allah – the Creator, the Maker, the Giver of Form
Qur'an 59: 24

ٱلَّذِىٓ أَحْسَنَ كُلَّ شَىْءٍ خَلَقَهُۥ وَبَدَأَ خَلْقَ ٱلْإِنسَـٰنِ مِن طِينٍ

He Who has perfected every thing He has created
Qur'an 32:7
Nothing that He creates is without value: each thing is created bi 'l-haqq, in truth and for right.

وَمَا خَلَقْنَا ٱلسَّمَـٰوَٰتِ وَٱلْأَرْضَ وَمَا بَيْنَهُمَا لَـٰعِبِينَ مَا خَلَقْنَـٰهُمَآ إِلَّا بِٱلْحَقِّ

And We did not create the heavens and earth and all that is between them in jest.
We have not created them but in truth.
Qur'an 44: 38-39

2.2 We affirm the He ecompasses all of His creation - He is Al-Muhit

وَلِلَّهِ مَا فِى ٱلسَّمَـٰوَٰتِ وَمَا فِى ٱلْأَرْضِ وَكَانَ ٱللَّهُ بِكُلِّ شَىْءٍ مُّحِيطًا

All that is in the heavens and the earth belongs to Allah.
Allah encompasses all things.
Qur'an 4: 126

2.3 We affirm that –

- God created the earth in perfect equilibrium (mīzān);
- By His immense mercy we have been given fertile land, fresh air, clean water and allthe good things on Earth that make our lives here viable and delightful;
- The earth functions in natural seasonal rhythms and cycles: a climate in which living beings – including humans – thrive;
- The present climate change catastrophe is a result of the human disruption of this balance –

وَٱلسَّمَآءَ رَفَعَهَا وَوَضَعَ ٱلْمِيزَانَ
أَلَّا تَطْغَوْا فِى ٱلْمِيزَانِ
وَأَقِيمُوا ٱلْوَزْنَ بِٱلْقِسْطِ وَلَا تُخْسِرُوا ٱلْمِيزَانَ
وَٱلْأَرْضَ وَضَعَهَا لِلْأَنَامِ

He raised the heaven and established the balance
so that you would not transgress the balance.
Give just weight – do not skimp in the balance.
He laid out the earth for all living creatures.
Qur'an 55: 7-10

2.4 We affirm the natural state (fitrah) of God's creation –

فَأَقِمْ وَجْهَكَ لِلدِّينِ حَنِيفًا فِطْرَتَ ٱللَّهِ ٱلَّتِى فَطَرَ ٱلنَّاسَ عَلَيْهَا
لَا تَبْدِيلَ لِخَلْقِ ٱللَّهِ ذَٰلِكَ ٱلدِّينُ ٱلْقَيِّمُ وَلَٰكِنَّ أَكْثَرَ ٱلنَّاسِ لَا يَعْلَمُونَ

So set your face firmly to the faith in pure devotion,
the natural pattern on which Allah made humankind.
There shall be no changing Allah's creation.

That is the true Way, but most people do not know.
Qur'an 30: 30

2.5 We recognize the corruption (fasād) that humans have caused on Earth in our relentless pursuit of economic growth and consumption. Its consequences have been –

▪Global climate change, which is our present concern, in addition to:
▪Contamination and befoulment of the atmosphere, land, inland water systems, and Seas;
▪ Soil erosion, deforestation and desertification;
▪ Destruction, degradation, and fragmentation of the habitats of the earth's communities of life, with devastation of some of the most biologically diverse and productive ecosystems such as rainforests, freshwater wetlands, and coral reefs;
▪ Impairment of ecosystem benefits and services;
▪ Introduction of invasive alien species and genetically modified organisms;
▪ Damage to human health, including a host of modern-day diseases.

ظَهَرَ ٱلْفَسَادُ فِى ٱلْبَرِّ وَٱلْبَحْرِ بِمَا كَسَبَتْ أَيْدِى ٱلنَّاسِ لِيُذِيقَهُم بَعْضَ ٱلَّذِى عَمِلُوا لَعَلَّهُمْ يَرْجِعُونَ

Corruption has appeared on land and sea
by what people's own hands have wrought,
that He may let them taste some consequences of their deeds,
so that they may turn back.
Qur'an 30: 41

2.6 We recognize that we are but a minuscule part of the divine order, yet within that order we are exceptionally powerful beings, and have the responsibility to establish good and avert evil in every way we can. We also recognize that –

▪ We are but one of the multitude of living beings with whom we share the earth;
▪ We have no right to abuse the creation or impair it;
▪ Intelligence and conscience should lead us, as our faith commands, to treat all things with care and awe (*taqwā*) of their Creator, compassion (*rahmah*) and utmost good (*ihsān*).

وَمَا مِن دَآبَّةٍ فِى ٱلْأَرْضِ وَلَا طَـٰٓئِرٍ يَطِيرُ بِجَنَاحَيْهِ إِلَّآ أُمَمٌ أَمْثَالُكُم

There is no animal on the earth, nor any bird that wings its flight
but is a community like you.

خَلْقُ ٱلسَّمَـٰوَٰتِ وَٱلْأَرْضِ أَكْبَرُ مِنْ خَلْقِ ٱلنَّاسِ وَلَـٰكِنَّ أَكْثَرَ ٱلنَّاسِ لَا يَعْلَمُونَ

The creation of the heavens and the earth
is greater than the creation of humankind,
but most people do not know.

مَّا فَرَّطْنَا فِي ٱلْكِتَـٰبِ مِن شَىْءٍ ثُمَّ إِلَىٰ رَبِّهِمْ يُحْشَرُونَ "لخَلْقُ السَّمَاوَاتِ وَالأَرْضِ أَكْبَرُ مِنْ خَلْقِ النَّاسِ وَلَكِنَّ أَكْثَرَ النَّاسِ لا يَعْلَمُونَ"

Qur'an 6: 38

Qur'an 40: 57

2.7 We recognize that we are accountable for all our actions –

فَمَن يَعْمَلْ مِثْقَالَ ذَرَّةٍ خَيْرًا يَرَهُ
وَمَن يَعْمَلْ مِثْقَالَ ذَرَّةٍ شَرًّا يَرَهُ

Then whoever has done an atom's weight of good, shall see it,
and whoever has done an atom's weight of evil, shall see it.
Qur'an 99: 7-8

2.8 In view of these considerations we affirm that our responsibility as Muslims is to act according to the example of the Prophet Muhammad (God's peace and blessings be upon him), who –

▪ Declared and protected the rights of all living beings, outlawed the custom of burying infant girls alive, prohibited wanton killing of living beings for sport, guided his companions to conserve water even in washing for prayer, forbade the felling of trees in the desert, ordered a man who had taken some nestlings from their nest to return them to their mother, and when he came upon a man who had lit a fire on an anthill, commanded, "Put it out, put it out!";
▪ Established inviolable zones (*harams*) around Makkah and Al-Madinah, within which native plants may not be felled or cut and wild animals may not be hunted or disturbed;
▪ Established protected areas (*himās*) for the conservation and sustainable use of rangelands, plant cover, and wildlife;
▪ Lived a frugal life, free of excess, waste, and ostentation;
▪ Renewed and recycled his meagre possessions by repairing or giving them away;
▪ Ate simple, healthy food, which only occasionally included meat;
▪ Took delight in the created world; and
▪ Was, in the words of the Qur'an, "a mercy to all beings."

WE CALL

3.1 We call upon the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) and the Meeting of the Parties (MOP) to the Kyoto Protocol taking place in Paris this December, 2015 to bring their discussions to an equitable and binding conclusion, bearing in mind –

▪ The scientific consensus on global climate change, which is to stabilize greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate systems;
▪ The need to set clear targets and monitoring systems;
▪ The dire consequences to the planet Earth if we do not do so;
▪ The enormous responsibility the COP shoulders on behalf of the rest of humanity, including leading us to a new way of relating to God's Earth

3.2 We particularly call on the well-off nations and oil-producing states to –

▪ Lead the way in phasing out their greenhouse gas emissions as early as possible and no later than the middle of the century;
▪ Provide generous financial and technical support to the less well-off to achieve a phase-out of greenhouse gasses as early as possible;
▪ Recognize the moral obligation to reduce consumption so that the poor may benefit from what is left of the earth's non-renewable resources;
▪ Stay within the '2 degree' limit, or, preferably, within the '1.5 degree' limit, bearing in mind that two-thirds of the earth's proven fossil fuel reserves remain in the ground;
▪ Re-focus their concerns from unethical profit from the environment, to preserving it and elevating the condition of the world's poor.
▪ Invest in the creation of a green economy.

3.3 We call on the people of all nations and their leaders to –

▪ Aim to phase out greenhouse gas emissions as soon as possible in order to stabilize greenhouse gas concentrations in the atmosphere;
▪ Commit themselves to 100 % renewable energy and/or a zero emissions strategy as early as possible, to mitigate the environmental impact of their activities;
▪ Invest in decentralized renewable energy, which is the best way to reduce poverty and achieve sustainable development;
▪ Realize that to chase after unlimited economic growth on a planet that is finite and already overloaded is not viable. Growth must be pursued wisely and in moderation; placing a priority on increasing the resilience of all, and especially the most vulnerable, to the climate change impacts already underway and expected to continue for many years to come.
▪ Set in motion a fresh model of wellbeing, based on an alternative to the current financial model, which depletes resources, degrades the environment, and deepens inequality.
▪ Prioritise adaptation efforts with appropriate support to the vulnerable countries with the least capacity to adapt, and to vulnerable groups, including indigenous peoples, women, and children.

3.4 We call upon corporations, finance, and the business sector to –

▪ Shoulder the consequences of their profit-making activities, and take a visibly more active role in reducing their carbon footprint and other forms of impact upon the natural environment;
▪ In order to mitigate the environmental impact of their activities, commit themselves to 100 % renewable energy and/or a zero emissions strategy as early as possible and shift investments into renewable energy;
▪ Change from the current business model, which is based on an unsustainable escalating economy, and adopt a circular economy that is wholly sustainable;
▪ Pay more heed to social and ecological responsibilities, particularly to the extent that they extract and utilize scarce resources;
▪ Assist in the divestment from the fossil fuel driven economy and the scaling up of renewable energy and other ecological alternatives.

3.5 We call on all groups to join us in collaboration, co-operation, and friendly competition in this endeavour, and we welcome the significant contributions taken by other faiths, as we can all be winners in this race –

وَلَـٰكِن لِّيَبْلُوَكُمْ فِى مَآ ءَاتَىٰكُمْ فَٱسْتَبِقُوا۟ ٱلْخَيْرَٰتِ إِلَى ٱللَّهِ مَرْجِعُكُمْ جَمِيعًا فَيُنَبِّئُكُم بِمَا كُنتُمْ فِيهِ تَخْتَلِفُونَ

But that He (God) may try you in that which He has
given you: So vie with one another
in doing good deeds.
Qur'an 5: 48

If we each offer the best of our respective traditions, we may yet see a way through our difficulties.

3.6 Finally, we call on all Muslims wherever they may be –
▪ Heads of state
▪ Political leaders
▪ Business community
▪ UNFCCC delegates
▪ Religious leaders and scholars
▪ Mosque congregations
▪ Islamic endowments (awqāf)
▪ Educators and educational institutions
▪ Community leaders
▪ Civil society activists
▪ Non-governmental organisations
▪ Communicators and media

To tackle habits, mindsets, and the root causes of climate change, environmental degradation, and the loss of biodiversity in their particular spheres of influence, following the example of the Prophet Muhammad (peace and blessings be upon him),and bring about a resolution to the challenges that now face us. Allah says in the Qur'an –

وَلَا تَمْشِ فِى ٱلْأَرْضِ مَرَحًا إِنَّكَ لَن تَخْرِقَ ٱلْأَرْضَ وَلَن تَبْلُغَ ٱلْجِبَالَ طُولًا

Do not strut arrogantly on the earth.
You will never split the earth apart
nor will you ever rival the mountains' stature.
Qur'an 17: 37

We bear in mind the words of our Prophet (peace and blessings be upon him):
The world is sweet and verdant, and verily Allah has made you stewards in it, and He sees how you acquit yourselves.
Hadīth related by Muslim from Abū Sa'īd Al-Khudrī)

appendix 3

Fatwa (religious pronouncement) of the Ulama Council of Indonesia

Number : 30 of 2016

Regarding:

LAW ON THE BURNING OF FORESTS AND LAND AND THE CONTROL THEREOF

The Fatwa Commission of the Ulama Council of Indonesia (MUI), upon:

TAKING INTO CONSIDERATION:

1. whereas, forests and land are blessings of Allah SWT (Glory to Him, the Exalted), that are important to be protected, preserved and utilized for the benefit of all;
2. whereas, efforts taken by the community to utilize forests and land often involve burning and thus causing damage and loss;
3. whereas, among such damage and loss caused by the fire is smoke, particularly in peat land, adversely affecting transportation, health, education, social activities, the economy, biodiversity, and the environment;
4. whereas, given such facts, questions arise with regard as to where the [Islamic] law stands on the burning of forests and land;
5. whereas, therefore, it is deemed necessary to establish a fatwa on the law that applies to the burning of forests and land and measures to control them, to serve as guiding principles.

RECALLING :

1. Al-Quran:

a. Words of Allah SWT elaborating on engaging a livelihood without causing damage to the earth:

كُلُوا وَٱشْرَبُوا مِن رِّزْقِ ٱللَّهِ وَلَا تَعْثَوْا فِى ٱلْأَرْضِ مُفْسِدِينَ

Meaning: "Eat and drink from the provision of Allah , and do not commit abuse on the earth, spreading corruption." (QS. al-Baqarah: 60).

b. Words of Allah SWT forbidding man to cause damage on land and in thesea through their deeds:

ظَهَرَ ٱلْفَسَادُ فِى ٱلْبَرِّ وَٱلْبَحْرِ بِمَا كَسَبَتْ أَيْدِى ٱلنَّاسِ لِيُذِيقَهُم بَعْضَ ٱلَّذِى عَمِلُوا لَعَلَّهُمْ يَرْجِعُونَ

Meaning: "Corruption has appeared throughout the land and sea by [reason of] what the hands of people have earned so He may let them taste part of [the consequence of] what they have done that perhaps they will return [to righteousness]." (QS. al-Rûm: 41)

وَلَا تُفْسِدُوا فِى ٱلْأَرْضِ بَعْدَ إِصْلَٰحِهَا وَٱدْعُوهُ خَوْفًا وَطَمَعًا إِنَّ رَحْمَتَ ٱللَّهِ قَرِيبٌ مِّنَ ٱلْمُحْسِنِينَ

Meaning: "And do not cause corruption on the earth after its restoration, and supplicate Him with fear and hope: indeed Allah's mercy is close to the virtuous." (Q.S. al-A'râf: 56)

c. Words of Allah SWT explaining the commandment to undertake good deeds:

إِنَّ ٱللَّـهَ يَأْمُـرُ بِٱلْعَـدْلِ وَٱلْإِحْسَـٰنِ وَإِيتَـآئِ ذِى ٱلْقُرْبَـىٰ وَيَنْهَـىٰ عَـنِ ٱلْفَحْشَـآءِ وَٱلْمُنكَـرِ وَٱلْبَغْـىِ يَعِظُكُمْ لَعَلَّكُمْ تَذَكَّرُونَ

Meaning: "Verily, Allah has ordered you to perform good deeds, and forbids you from committing malice, disobedience and acts of hostility. He provides with teachings so that you may take heed." (Q.S. An Nahl: 90)

وَٱبْتَغِ فِيمَـآ ءَاتَىٰكَ ٱللَّـهُ ٱلدَّارَ ٱلْـَٔاخِرَةَ وَلَا تَنسَ نَصِيبَكَ مِنَ ٱلدُّنْيَا وَأَحْسِن كَمَآ أَحْسَنَ ٱللَّـهُ إِلَيْكَ وَلَا تَبْغِ ٱلْفَسَادَ فِى ٱلْأَرْضِ إِنَّ ٱللَّـهَ لَا يُحِبُّ ٱلْمُفْسِدِينَ

Meaning: "And seek what has been blessed upon you (bliss) at the afterlife, and do not forsake your joy in the world and do good (upon others) as Allah has bestowed upon you, and you shall not bring corruption to this world. Verily, Allah disfavors those who commit harm." (Q.S. Al Qashash [28] :77)

d. Words of Allah SWT forbidding the pursuit of desires that can lead to Destruction:

وَلَوِ ٱتَّبَعَ ٱلْحَقُّ أَهْوَآءَهُمْ لَفَسَدَتِ ٱلسَّمَـٰوَٰتُ وَٱلْأَرْضُ وَمَن فِيهِنَّ بَلْ أَتَيْنَـٰهُم بِذِكْرِهِمْ فَهُمْ عَن ذِكْرِهِم مُّعْرِضُونَ

Meaning: "And if the truth were to follow their desires, verily, the heavens and the earth, the sky and earth would crumble. Nay, We have brought them their blessing, but they turn away from their blessing." (Q.S. al-Mu'minûn: 71).

e. Words of Allah SWT on the consequence for people committing wrongful deeds:

وَٱلَّذِينَ كَسَبُوا۟ ٱلسَّيِّـَٔاتِ جَزَآءُ سَيِّئَةٍۭ بِمِثْلِهَا وَتَرْهَقُهُمْ ذِلَّةٌ ۖ مَّا لَهُم مِّنَ ٱللَّهِ مِنْ عَاصِمٍ ۖ كَأَنَّمَآ أُغْشِيَتْ وُجُوهُهُمْ قِطَعًا مِّنَ ٱلَّيْلِ مُظْلِمًا ۚ أُو۟لَٰٓئِكَ أَصْحَٰبُ ٱلنَّارِ ۖ هُمْ فِيهَا خَٰلِدُونَ

Meaning: "And those who have earned evil deeds, the recompense of an evil deed is the like thereof, and humiliating disgrace will cover them (their faces). No defender will have from Allah. Their faces will be covered, as it were, with pieces from the darkness of night. They are dwellers of the Fire, they will abide therein forever." (Q.S. Yûnus: 27).

f. Words of Allah SWT forbidding the commission of misdeeds that prejudice a person's rights and causing damage:

وَلَا تَبْخَسُوا۟ ٱلنَّاسَ أَشْيَآءَهُمْ وَلَا تَعْثَوْا۟ فِى ٱلْأَرْضِ مُفْسِدِينَ

Meaning: "And defraud not people by reducing their things, nor act with greed by causing damage." (Q.S. al-Syu'arâ': 183).

g. Words of Allah SWT explaining disaster as brought upon by man's own deed:

وَمَآ أَصَٰبَكُم مِّن مُّصِيبَةٍ فَبِمَا كَسَبَتْ أَيْدِيكُمْ وَيَعْفُوا۟ عَن كَثِيرٍ

Meaning: "And whatever of misfortune befalls you, it is because of what your hands have earned. And He pardons much." (Q.S. al-Syûrâ: 30).h. Words of Allah SWT explaining the obligation to obey Allah SWT, the Prophet SAW, and Ulil Amri:

يَٰٓأَيُّهَا ٱلَّذِينَ ءَامَنُوٓا۟ أَطِيعُوا۟ ٱللَّهَ وَأَطِيعُوا۟ ٱلرَّسُولَ وَأُو۟لِى ٱلْأَمْرِ مِنكُمْ ۖ فَإِن تَنَٰزَعْتُمْ فِى شَىْءٍ فَرُدُّوهُ إِلَى ٱللَّهِ وَٱلرَّسُولِ إِن كُنتُمْ تُؤْمِنُونَ بِٱللَّهِ وَٱلْيَوْمِ ٱلْءَاخِرِ ۚ ذَٰلِكَ خَيْرٌ وَأَحْسَنُ تَأْوِيلًا

Meaning: "O you who are of faith! Obey Allah and obey the Prophet (Muhammad), and those of you (Muslims) who are in authority. (And) if you differ in anything amongst yourselves, refer it to Allah and His Prophet, if you believe in Allah and in the Last Day. That is better and more suitable for final determination." (Q.S. al-Nisâ': 59).

2. Hadith of the Prophet Muhammad SAW, among others:

a. Hadith as told by Abû Dâwud and Ahmad from Anas ibnu Mâlik:

عن أنس بن مالك قال رسول الله صلّى الله عليه وسلّم: "إن قامت الساعة وفي يد أحدكم فسيلةٌ فإن استطاع أن لا تقوم حتى يغرسها فليفعل" - رواه أبو داود وأحمد.

Meaning: Anas the son of Malik told of the words spoken by the Prophet SAW: "Once the end of days is upon us, and in the hands of you there is a seed of the date fruit, if you are able to plant (such seed of date), do so." (H.R. Abû Dâwud and Ahmad).

b. Hadith as told by Muslim from Jabir ra:

عن جابر بن عبد الله، أنّ رسول الله صلّى الله عليه وسلّم، قال: "اتّقوا الظلم، فإنّ الظلم ظلمات يوم القيامة، واتّقوا الشحّ، فإنّ الشحّ أهلك من كان قبلكم، حملهم على أن سفكوا دماءهم واستحلّوا محارمهم" – رواه مسلم.

Meaning: From Jabir bin 'Abdullah, the Prophet SAW has spoken: "Keep way from cruel acts, as such acts only bring forth darkness at the end of days, and keep away from miserly behavior, as such behavior has destroyed people before you, bringing upon them bloodshed and to make halal (permissible) of what ought to be haram (forbidden)." (H.R.Muslim).

c. Hadith as told by Ibnu Mâjah, al-Thabarâni and al-Baihaqi from Ibnu'Abbâs ra.
عن ابن عبّاس، قال رسول الله صلّى الله عليه وسلّم: "لا ضَرَرَ ولا ضِرارَ" – رواه ابن ماجة والطبراني والبيهقي.
Meaning: From Ibnu 'Abbâs ra, the Prophet SAW has spoken: "Do not endanger/ harm yourselves and others." (H.R. Ibnu Mâjah, al-Thabarâni and al-Baihaqi).

d. Hadith as told by al-Bukhâri and Muslim from 'Abdullâh ibnu 'Amr ibnu Ash
عن عبد الله بين عمرو بين العاص، يقول: "إنّ رجلًا سأل رسول الله صلّى الله عليه وسلّم أيُّ المسلمين خيرٌ؟ قال "من سَلِمَ المسلمون من لسانه ويده" - رواه البخاري ومسلم.
Meaning: 'Abdullah bin 'Amru bin 'Ash told: a man asked the Prophet SAW: "What makes the most virtuous Moslem?" The Prophet SAW answered: "Those (Moslems) who save other Moslems through his word and hands." (H.R. al-Bukhari and Muslim).

e. Hadith as told by Ahmad from Sa'id bin Zaid :

عن سعيد بن زيد قال سمعت النبيّ صلّى الله عليه وسلّم يقول "من ظَلَمَ من الأرض شيئًا فإنّه يُطَوَّقُهُ من سبع أرضين"
Meaning: Sa'îd bin Zaid said, "I heard the Prophet SAW spoke: 'Who commits cruelty to the earth even along only one span of the hand, then he shall be burdened by seven layers of the earth." (H.R. Ahmad).

f. Hadith as spoken by Abu Dawud and al-Tirmidzi from Sa'id bin Zaid:

عن سعيد بن زيد عن النبيّ صلّى الله عليه وسلّم قال: "من أحيا أرضًا مَيّتَةً فهي له وليس لِعِرْقِ ظالمٍ حَقٌّ" رواه أبو داود والترمذي.
Meaning: Sa'îd bin Zaid told of the Prophet SAW who has spoken: "He who has toiled an ownerless land, than such land shall be his right, and no right shall be given to dishonest venture." (H.R. Abû Dâwud and al-Tirmidzi).

g. Hadith as told by Jâbir bin 'Abdillâh:

عن جابر بن عبد الله، قال: قال رسول الله صلّى الله عليه وسلّم: "من أحيا أرضًا مَيّتَةً فله بها أجرٌ، وما أكَلَتِ العوافي فله بها أجرٌ" رواه النسائي.
Meaning: Jâbir bin 'Abdillâh of the Prophet SAW who has spoken: "He who has toiled a land that has gone unused shall receive blessing (pahala). And when any of such work is eaten by a wild animal, then he shall receive blessing (pahala)." (H.R. al-Nasâ'i).

3. Principles of fiqh (interpretation of the Sharia law):

الضّرر يُزال
Meaning: "All harmful and useless things must be abolished."

الضّرر لا يُزال بالضّرر
Meaning: "A harmful and useless thing cannot be substituted for (another) harmful and useless thing."

دَرْءُ المفاسد مُقدّمٌ على جلب المصالح
Meaning: "Preventing harm brought upon by an unlawful deed shall take precedent over the pursuit of benefit."

تَصرّف الإمام على الرّعية منوطٌ بالمصلحة
Meaning: "The policies of the imam (government) over the affairs of the people shall be for the prosperity/benefit of the people."

TAKING INTO ACCOUNT:

1. The opinion of al-Syâthibi in al-Muwâfaqât fî Ushûl al-Syari'ah, volumeII, pages 198-199:

الْمَفْهُومُ مِنْ وَضْعِ الشَّارِعِ أَنَّ الطَّاعَةَ أَوِ الْمَعْصِيَةَ تَعْظُمُ بِحَسَبِ عِظَمِ الْمَصْلَحَةِ أَوِ الْمَفْسَدَةِ النَّاشِئَةِ عَنْهَا، وَقَدْ عُلِمَ مِنَ الشَّرِيعَةِ أَنَّ أَعْظَمَ الْمَصَالِحِ جريانُ الْأُمُورِ الضَّرُورِيَّةِ الْخَمْسَةِ الْمُعْتَبَرَةِ فِي كُلِّ مِلَّةٍ، وَأَنَّ أَعْظَمَ الْمَفَاسِدِ مَا يَكِرُّ بِالْإِخْلَالِ عَلَيْهَا.

Meaning: Understanding the intent of the Sharia (Allah SWT), it is that the extent of obedience or sin is dependent on the extent of the harmful effect or (conversely) the benefit that has been brought upon. It can be derived from the Islamic Sharia that the benefit comes from the five articles of dharuri as acknowledged in every rule, and that harm are the issues that impede them."

2. Opinion of Syihâbuddîn ibn Idrîs ibn 'Abdur Rahmân, in al-Furuq, Volume III, page 94:

فَإِنَّ الشَّرْعَ خَصَّصَ الْمَرْتَبَةَ الْعُلْيَا مِنْ الْمَصَالِحِ بِالْوُجُوبِ وَحَثَّ عَلَيْهَا بِالزَّوَاجِرِ صَوْنًا لِتِلْكَ الْمَصْلَحَةِ عَنْ الضَّيَاعِ كَمَا خَصَّصَ الْمَفَاسِدَ الْعَظِيمَةَ بِالزَّجْرِ وَالْوَعِيدِ حَسْمًا لِمَادَّةِ الْفَسَادِ عَنْ الدُّخُولِ فِي الْوُجُودِ

Meaning: Islamic Shariah Islam verily upholds the pursuit of benefit for the people as an obligation, and exert control through various prohibitions to safeguard such benefit. Likewise, Islamic Shariah looks at major harmful effects as forbidden and a threat, to be prevented and keep from occurring.

3. Opinion of 'Izzuddîn ibn 'Abdus Salâm in Qawâ'îd al-Ahkâm fî Mashâlih al-Anâm, Volume I, page 127:

وَكُلَّمَا قَوِيَتْ الْوَسِيلَةُ فِي الْأَدَاءِ إلَى الْمَفْسَدَةِ كَانَ إثْمُهَا أَعْظَمَ مِنْ إثْمِ مَا نَقَصَ عَنْهَا

Meaning: When the cause that brings harmful effect is strong, then the sin becomes greater and exceeds the sin resulting from a minor cause.

4. Opinion of Muhammad ibn Ahmad al-Fasiy, in al-Itqân wa al-Ihkâm, Volume II, page 105:

كُلُّ مَنْ أَتْلَفَ شَيْئًا فَوَجَبَ عَلَيْهِ ضَمَانُهُ بِإِتْلَافِهِ فَإِنَّهُ مُطَالَبٌ بِإِخْلَافِهِ فَإِنْ كَانَ الْمُتْلَفُ بِالْفَتْحِ مِنْ ذَوَاتِ الْأَمْثَالِ فَيَضْمَنُ مِثْلَهُ، وَإِنْ كَانَ مِنْ ذَوَاتِ الْقِيَمِ ضَمِنَ قِيمَتَهُ

Meaning: All persons who cause damage must bear the responsibility, and is demanded to provide restitution. If the object that is damaged has a similar counterpart, then he shall make replace with such similar counterpart. And if the object can only be valued with its price, than he shall replace according to such price.

5. Opinion of ' li Haidar in Durar al-Hukkâm, Volume II, page 597:

الْإِتْلَافُ مُبَاشَرَةً يُوجِبُ الضَّمَانَ عَلَى كُلِّ حَالٍ. وَلَا يُشْتَرَطُ فِيهِ وُجُودُ التَّعَدِّي وَالتَّعَمُّدِ. أَمَّا الْإِتْلَافُ تَسَبُّبًا فَهُوَ مُوجِبٌ لِلضَّمَانِ إِذَا كَانَ تَعَدِّيًا أَوْ تَعَمُّدًا وَإِلَّا فَلَا.

Meaning: Direct damage caused in any circumstances shall create an obligation on the part of the offender to be liable for such damage, even when the commission of such deed has not been through recklessness or without deliberation. If damage is for a reason, the offender shall be liable if the cause was with recklessness or deliberation. And if the act was committed without recklessness or deliberation, then no obligation of liability exists.

6. Result of the 2nd Indonesian Ijtima of Ulamas of the Indonesian Fatwa Commission of 2006 on the Management of Natural Resources.

7. Fatwa of the Ulama Council of Indonesia Number 2 of 2011 on the Environmentally Friendly Mining Operations.

8. Fatwa of the Ulama Council of Indonesia Number 04 of 2014 on the Conservation of Endangered Animal Species to Maintain the Balance of the Ecosystem.

9. Law Number 41 of 1999 on Forestry, Law Number 32 of 2009 on the Protection and Management of the Environment, Law Number 39 of 2014 on Plantation, Government Regulation Number 45 of 2004 the Forest Protection, Government Regulation Number 71 of 2014 on the Protection and Management of Peat Ecosystem, Regulation of the Minister of Environment and Forestry Number P.32/ MenLHK/Setjen/Kum.1/3/2016 on the Control of Forest and Land Fire, Regulation of the Minister of Environment Number 10 of 2010 on the Mechanism for the Prevention of Pollution of and/or Damage to the Environment Relating to Forest Fire and/or Land Fire.

10. Result of workshops, field visits, meetings and assessment of the Fatwa Commission Team working in conjunction with the Ministry of the enviironment and Forestry over the period from 31 March to 10 June 2016.

11. Opinions, recommendations and inputs developed during the Fatwa commission Session of the Ulama Council of Indonesia during its Plenary session on 27 July 2016.

HAS RESOLVED

TO ESTABLISH : FATWA ON THE LAW REGARDING THE BURNING OF FORESTS AND LAND AND THE CONTROL THEREOF

Firstly : General provisions

In this fatwa, the following terms shall have the meaning as ascribed to them:

1. Forest is a unit of ecosystem consisting of an area of land made up of natural resources dominated by trees as an integral and inseparable part of the environment.
2. Land is an inland expanse of ecosystem external to a forest that is utilized for economic enterprise, agricultural activities and/or people's plantation.

3. Burning of forest and land is a deliberate act of humans that causes forests and land to be set on fire.
4. Control of forest and land fire is the prevention, mitigation and management of fire.

Secondly : Legal Provisions

1. The burning of forests and land that can cause damage, pollution, harm to other persons, adverse health effects, and other harmful effects, is religiously forbidden (haram).
2. Facilitating, allowing, and/or deriving benefit from the burning of forests and land as referred to in item 1 is religiously forbidden (haram).
3. Burning forests and land as referred to in item 1 constitute a crime and the offender is punishable based on the extent of the damage and impact rendered.
4. The control of forest and land fire as referred to in the general provision is mandatory.
5. The utilization of forests and land is in principle allowed, subject to the following conditions:
    a. formal rights for such utilization must be acquired
    b. license for utilization must be obtained from the appropriate authorities in accordance with the prevailing regulations
    c. utilization must be for the positive benefit of the people
    d. utilization must not cause damage and adverse impact,including damaging the environment.
6. Utilization of forests and land that is not in line with the requirements set forth in paragraph 5 is religiously forbidden (haram).

Thirdly : Recommendations

1. The national as well as the local governments should:
    a. harmonize the regulations related to the utilization of forests and land to avoid overlaps;
    b. disseminate information on the applicable laws and norms related to the use of forests and land through various approaches, including religious based approach through the involvement of religious leaders;
    c. provide sustained education to the public regarding the use of forests and land through various approaches, including public education and outreach and religious sermons;
    d. empower communities by reinforcing the concept of social forestry and facilitating the preparation of forest and land area without using fire;
    e. provide environmentally friendly technology;
    f. establish equitable policies with regard to the issuance of licenses to utilize forests and land to the public;
    g. control forest and land fire by building synergy among the relevant institutions/agencies;
    h. conduct strict and fair enforcement of the law against perpetrators of forest and land fire that may cause damage, pollution, harm to others, harm to public health, and other adverse effects, whether involving individuals or corporations.

2. Businesses should:
   a. comply with every law and regulations concerning the utilization of forests and land;
   b. conduct community empowerment, particularly for communities living around forests and land, to further their prosperity;
   c. ensure the conservation of the environment;
   d. provide human resources and facilities to control forest and land fire;
   e. procure appropriate environmentally friendly technology for the preparation of land clearing.

3. The community should:
   a. conduct constructive measures to prepare forest and land area without setting fire;
   b. conduct measures to prevent and mitigate forest and land fire in accordance with the applicable laws and regulations;
   c. actively participate in monitoring for and preventing the practices of burning forests and land that may cause damage, pollution, harm to others, harm to public health, and other adverse effects.

4. The government, businesses and the communities should undertake expedited environmental preservation through post-fire reforestation and restoration.

Fourthly : Concluding Provisions

1. This fatwa shall come into effect on the date of its affirmation, on the condition that should there be any amendment required, it shall be amended and rectified as necessary.
2. To procure that every Moslem and persons are informed of this fatwa, it is called upon to all parties to disseminate the same.

Affirmed in : Jakarta
On : 22 Syawal 1437 H.
27 July 2016

ULAMA COUNCIL OF INDONESIA, FATWA COMMISSION
Chairperson: PROF. DR. H. HASANUDDIN AF,
Secretary :MA. DR. HM. ASRORUN NI'AM SHOLEH, MA.


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