The Great Intersection

Rethinking Our Response to Interconnected Global Crises

グレート・インターセクション

つながりあう危機に直面する地球を守るために

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はじめに

近年、気候危機はかつてない深刻さを増し、その影響は地球規模で広がっています。毎年夏の暑さは増し、日本やヨーロッパでも 40 度を超えるようになってきました。また、これまでになく、洪水や干ばつ、そして山火事が世界のいたるところで起こるようになってきました。30 年後、40 年後の地球はどうなるのかに大きな危機感を覚え、若い世代の人たちが世界の各地で温暖化対策に立ち上がっています。私たちが過去、そして現在行っているどのようなことが原因なのでしょうか。

地球温暖化による異常気象や海面上昇は、生物多様性の損失や食糧生産への影響を引き起こし、過剰消費や資源枯渇、大気汚染、農業由来の環境汚染など、さまざまな問題と複雑に結びついています。さらに、環境の変化は感染症の拡大など公衆衛生にも深く関わっており、私たちは相互に連鎖する危機のただ中にあります。

本書は、これらの課題を単なる個別の環境問題としてではなく、相互に関連し合う現象として総合的に捉え、その背景と解決への糸口を論理的に整理し、解決策を自ら模索する姿勢を育みながら、英語力をインプットとアウトプットの両方で向上することを目的としています。科学的知見をもとにした多角的な視点から、現代社会が直面する「グレートインターセクション」に迫ります。

構成は、気候危機、生物多様性危機、環境悪化と公衆衛生の関係、産業型農業の汚染問題、そして食の未来という 5 つのテーマから成り立っています。各章では、背景知識の理解を深める読み物、批判的思考を促す問いかけ、そして、「読む・書く・聞く・話す」の 4 技能を統合的に伸ばす活動を組み合わせ、総合英語学習の場として活用できるよう工夫しました。

地球規模の危機は、一人ひとりの意識と行動の積み重ねによってしか乗り越えることはできません。本書が、未来を担う皆さんにとって、英語力を向上させるだけでなく、世界をより良い方向へ導くための思考と行動の一助となることを願っています。

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著者一同

本書の構成と各セクションの内容

Section 1: The Climate Crisis

気候変動や地球温暖化の深刻な現実を、経済・社会・文化への影響も含めて総合的に考察する。IPCC 報告や最新研究を踏まえ、産業革命以降の気候科学の発展や国際的政策形成の歴史を学び、科学と社会の相互作用を理解する。

Section 2: The Biodiversity Crisis

気候変動が水循環や海洋に及ぼす影響、森林火災や汚染による生物多様性の損失を分析する。海洋酸性化や過剰漁業などの問題、再野生化による生態系回復の意義と事例を取り上げ、自然再生の必要性を論じる。

Section 3: Environmental Degradation and Public Health

大気・水汚染の歴史と主要汚染物質の影響、公害事例から得られる教訓を学ぶ。呼吸器疾患や認知症リスク、小児の発達への影響、水汚染による感染症・慢性疾患のリスクを解説。森林破壊や都市化による人獣共通感染症の拡大メカニズムと予防策も扱う。

Section 4: Over-Consumption and Agricultural Pollution

農薬・化学肥料や畜産廃棄物による汚染の実態と多方面への悪影響を分析。農業汚染が生物多様性や気候変動に与える重複的影響を明らかにし、有機農業や無農薬農法など持続可能な解決策を検討する。

Section 5: The Future of Food

人口増加や気候変動、資源不足による食料生産の課題を整理。都市農業の可能性や技術革新、細胞培養による食料生産の事例と環境・経済・倫理的課題を論じ、持続可能な食の未来を展望する。

Critical Thinking Corner

セクションごとのそれぞれの問題について、提供された資料や自分で集めた資料を基に話し合い、協働学習でさらなる内容理解と英語技能を高めることを目標にする。

各ユニットの構成

1 Pre-reading

図や写真などの視覚資料を用いて、テーマに関連する語彙や概念を事前確認します。

2 Reading

本文を通じてテーマの背景、科学的知見、社会的影響を学びます。

3 Notes

本文中の重要語彙・表現を発音記号とともに提示し、意味と用例を確認します。専門用語や学術表現の正確な理解を促します。

4 Exercises

I Comprehension ..... True/False 問題で読解確認。

II Summary ..... 空所補充による要約練習。

III Vocabulary and Idiomatic Expressions ..... 文脈に合う語彙の選択と日英訳。

IV Listening Comprehension: Short Conversation

..... 関連する短い会話の聞き取りと理解問題。

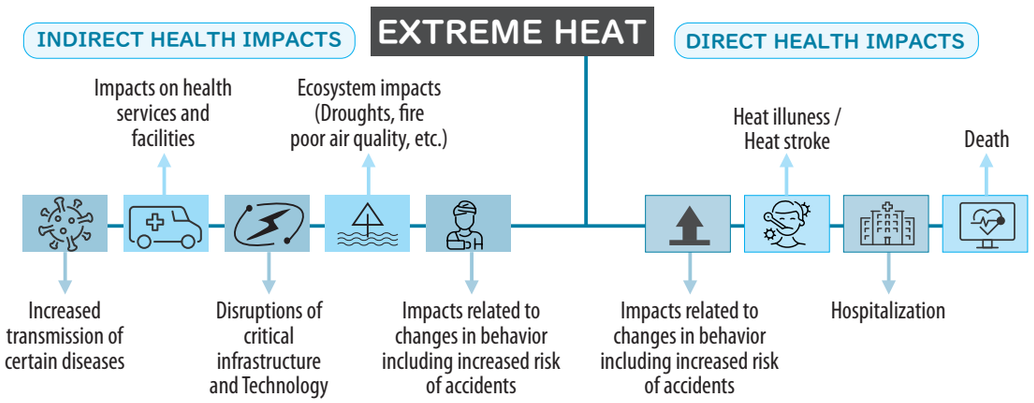
Contents

Unit 1: The Hard Realities of Climate Change: Our Most Urgent Challenges

近年，人為的な地球温暖化（AGW）の影響が強調され，気温の上昇を2℃以内に抑える目標が設定されました。しかし，科学者は1.5℃の目標が重要で，特にサンゴ礁や生態系への影響が懸念されています。温暖化は農業や生物多様性に深刻な影響を与え，気候変動は水循環や自然災害，人間の健康にも大きくかかわっています。これらはどのように繋がっているでしょうか。現在私たちの周りで起こっている洪水や山火事などの事象を全体的に整理し，持続可能な未来に必要な包括的な対応を考えていきましょう。

Pre-reading

下の図は「極端な暑さ」が人体に直接的，間接的に与える影響をあらわしたものです。
それぞれの項目の日本語訳の空所に適語を入れて完成してみましょう。



Indirect health impacts

1. Increased transmission of certain diseases [一部の疾病の（　　）]
2. Impacts on health services and facilities [（　　）への影響]
3. Disruptions of critical infrastructure and technology [重要インフラと（　　）]
4. Ecosystem impacts (drought, wildfire, poor air quality, etc.) [　　]
5. Impacts related to changes in behavior, including increased risk of accidents [　　]

Direct health impacts

1. Exacerbations of pre-existing conditions and mental-health impacts [　　]
2. Heat illness/heat stroke [　　]
3. Hospitalization [　　]
4. Death [　　]

Reading 02

Societal awareness has noticeably shifted in recent years, expanding beyond traditional fields of human activity. A key focus of this new perspective is the widespread impact of anthropogenic global warming (AGW), a phenomenon that has been deeply embedded in human history since the onset of the Industrial Revolution and is now the subject of intense debate. The 2015 Paris Agreement aimed to limit AGW to below 2°C and to pursue efforts for 1.5°C. However, a precarious "consensus" now suggests that a 2°C cap will suffice. The latest report, meanwhile, shows that 2°C is perilously high and stresses the urgency of setting a 1.5°C target. The scientific community warns of devastating ecological disruptions even at 1°C warming and worsening at 1.5°C. For example, coral reefs face extinction at 1.5°C and total collapse at 2°C. Thus, AGW's effect on ocean ecosystems magnifies the phenomenon's repercussions by triggering cascading effects such as the loss of ocean protein that is critical for communities reliant on the sea for sustenance. Consequently, the latest report urges global leaders to adopt the 1.5°C target, voiding the 2°C threshold, with some research findings suggesting that we may reach 1.5°C by 2040 or even sooner.

As we navigate the twin crises of Biodiversity Loss and Climate Change, our response to them confronts multifaceted challenges. These challenges include the escalating risks of heat stress, with a particular emphasis on the ever-increasing dangers of encountering wet-bulb temperature conditions. Animals, both domesticated and wild, are susceptible to heat-related illnesses, which demand specialized care from veterinary professionals to mitigate the adverse impacts on animals' health.

As climate chaos intensifies, with rising temperatures leading to floods, droughts, and other extreme weather events, the impact on agriculture is exacerbating interconnected global issues. Beyond the immediate threats to crops, Earth's intricate web of life is unraveling due to the loss of biodiversity, placing oceans and humanity at risk. To address these challenges, rewilding has become a desperate need to restore nature's balance.

Climate change is also affecting the hydrological cycle, leading to more frequent and more severe storms. More than 90% of disasters considered "natural" are linked to weather and water, including droughts, desertification, wildfires, pollution, and flooding. These events cause death, injury, economic loss, and human displacement, putting significant strain on societies, economies, and natural ecosystems.

A recent paper published in *Nature* highlights the concept of the "human climate niche," a term referring to the specific climate conditions favorable for human civilization's growth and prosperity. This means that human settlements are concentrated in regions where the climate is most conducive to our well-being. However, these optimal conditions are diminishing in many areas, leaving approximately 600 million people living in severe climate conditions brought on by global warming. Projections suggest that without significant policy changes, global temperatures could rise by 2.7°C by 2100 potentially displacing nearly two billion people from their climate niches by 2030 and 3.7 billion by 2090. If governments limited atmospheric heating to their agreed goal of 1.5°C, the number of people exposed to extreme heat would be reduced by five times. Conversely, neglecting climate goals could result in a 4.4°C increase in temperatures, threatening by this century's end some 5.3 billion people with a broad range of life-threatening challenges, including air pollution, agricultural disruption, food insecurity, water scarcity, and the spread of infectious diseases. These figures exclude the impacts of sea-level rise, which could further displace hundreds of millions.

The critical point in all this lies at the intersection of environmental degradation and public health. This connection reveals the historical legacy of air pollution, linking it to an array of adverse health effects, including cardiovascular diseases, respiratory illnesses, dementias, cognitive development issues in children, mental health challenges, and malnutrition. Zoonotic diseases, which are transmissible from animals to humans, are exacerbated by environmental degradation and pose additional threats. Moreover, pollution resulting from industrial agriculture further compounds the problem, posing multiple, overlapping dangers. To mitigate these risks, it is crucial for the younger generation to understand what industrial agricultural pollution is and to explore collective strategies for reducing it.

Looking ahead, food production faces significant challenges as well, but fortunately, innovations like urban farming and cellular agriculture offer promising solutions. Tackling climate chaos requires more than CO_2 reduction, however. It demands shifts in people's consumption patterns, reduced reliance on animal-based proteins, and the implementation of sustainable living practices. Only holistic measures can address these complex issues and lead us toward a sustainable, resilient future. In this textbook, we will explore these challenges together and find ways to move forward.

Notes: **anthropogenic** [ænθrəpədʒénɪk] **global warming (AGW)**「人為的地球温暖化」 **perilously**「危険なほどに」 **devastating**「破壊的な」 **disruption**「崩壊，混乱」 **collapse** [kəlǽps]「崩壊する」 **magnify**「拡大する」 **repercussions**「（間接的）影響，波紋」 **cascading effects**「連鎖的影響」（あることが次々と影響を及ぼしていくこと） **twin crises**「二重（双子）の危機」（同時に発生している二つの重大な問題や危機を指す） **biodiversity**「生物多様性」 **wet-bulb temperature condition**「湿球温度条件」（湿度と気温の両方を考慮した温度で，特に熱ストレスや蒸発冷却に関する条件を評価する際に重要） **mitigate**「緩和する，軽減する」 **climate chaos**「気候カオス，気候混乱」（気候変動によって引き起こされる極端な天候や予測不可能な気候パターン） **intricate** [íntrikət]「入り組んだ，もつれた」 **web of life**「生命の網，生命のつながり」（生物同士が複雑に相互作用しながら形成する生態系全体を指す表現） **rewinlding**「野生環境の再生，生態系の復元」 **climate niche**「気候ニッチ」（特定の生物が適応し繁栄できる気候条件の範囲） **prosperity**「繁栄」 **environmental degradation** [dègrədéiʃən]「環境劣化」 **cardiovascular diseases**「循環器系疾患，心疾患」 **dementia**「認知症」 **malnutrition**「栄養不良，栄養失調」 **zoonotic** [zòuənátik]「人獣共通感染（症）の」 **cellular agriculture**「細胞農業」

Exercises

I Comprehension

次の各英文のうち，本文の内容と一致するものはT，一致しないものはFを（　　）に書き入れなさい。

1. (　　) The latest report shows that a 1.5°C target is sufficient to prevent all major ecological disruptions.

2. (　　) Coral reefs face extinction at 1.5°C of warming and total collapse at 2°C, affecting ocean ecosystems and communities that rely on marine protein.

3. (　　) Human settlements are mostly located in regions where climate conditions are favorable for civilization's growth, a phenomenon referred to as the "human climate niche."

4. (　　) The Paris Agreement aims to limit anthropogenic global warming (AGW) to below 2.5°C, with efforts to limit the temperature increase to 2°C.

5. (　　) Neglecting climate goals could result in a 3.5°C increase in temperatures, threatening some four billion people with various life-threatening challenges by this century's end.

II Summary

以下は本文（Reading Part）を要約したものです。（　　）内に当てはまる語彙を以下の①～⑤から選んで書き入れなさい。

Recent reports stress that a 2°C global atmospheric temperature limit is perilously high, with significant ecological disruptions coming at 1°C and worsening at 1.5°C, with (　　) facing extinction. This exacerbates a host of global problems, including extreme weather, threats to (　　), agriculture, and human health. The concept of the "human climate niche" highlights human displacement risks due to climate change, potentially affecting billions of people by 2100. Addressing these challenges requires the implementation of (　　) strategies, including (　　), sustainable practices, and innovative approaches like urban and (　　) agriculture. Neglecting climate goals could result in severe consequences, including increasingly high global temperatures and widespread health and environmental impacts.

① rewilding　② comprehensive　③ biodiversity　④ cellular　⑤ coral reefs

III Vocabulary and Idiomatic Expressions

次の各英文の空欄に入る最も適切なものを下の選択肢から選びなさい。またその用語の日本語訳も書きなさい。

1. Adopting (　　) such as reducing waste, conserving water, and using renewable energy is essential for minimizing our environmental footprint.

日本語訳 [　　]

2. The company is (　　) traditional markets to reach new international customers.

[　　]

3. Climate change significantly disrupts the (　　), causing more frequent and more severe weather events such as storms and droughts.

[　　]

4. Deforestation can lead to (　　) on ecosystems around the globe, including soil erosion, loss of biodiversity, and climate change.

[　　]

5. Traditional values are deeply (　　) the culture of communities everywhere.

[　　]

① sustainable living practices　② embedded in　③ hydrological cycle
④ expanding beyond　⑤ cascading effects

IV Listening Comprehension: Short Conversation

03

音声を聞き，各設問の答えとして最も適切なものを（A）～（D）から1つずつ選びなさい。

Q1: According to the conversation, what is one of the main reasons why wildfires are becoming more common?

(A) Increased rainfall　　(B) Rising temperatures

(C) Decreased vegetation　　(D) Ocean warming

Q2: According to the conversation, what is one of the key actions needed to address the increasing frequency of extreme weather events?

(A) Increasing industrial activities and urban expansion

(B) Strengthening disaster preparedness and reducing greenhouse-gas emissions

(C) Enhancing fossil fuel extraction and usage

(D) Expanding agricultural land and deforestation

Unit 2: A Brief History of Climate-Science Breakthroughs

いつ頃から，気候変動について問題視する声が上がったのでしょうか。私たちの生活に目に見える変化が起こってきたのは最近ですが，1980年代からその動きが出てきたと言われています。ここでは気候変動についての人々の理解と，その対策が始まり進展した歴史について探ります。特に，科学的発見と技術の進歩が果たす重要な役割について考えていきましょう。まずは歴史を知って，未来に進んでいきたいですね。

Pre-reading

次の1～5の用語の意味として最も適切なものをア～オの中から選び（　　）に書きなさい。さらにその意味としてふさわしい日本語を〔　　〕に書きなさい。

1. **ice cores**　（　　）日本語訳［　　］
2. **critical driver**　（　　）［　　］
3. **ocean acidity**　（　　）［　　］
4. **biodiversity**　（　　）［　　］
5. **habitat destruction**　（　　）［　　］

ア. Seawater's acid concentration, primarily affected by how much carbon dioxide (CO_2) seawater absorbs from the atmosphere.

イ. The process by which natural environments are damaged or destroyed, leading to the loss of biodiversity and impairment of ecosystem functions.

ウ. A key factor or force that significantly influences a process, system, or outcome.

エ. The variety of life in a particular habitat or ecosystem, including species diversity, genetic diversity, and ecosystem diversity.

オ. Cylindrical ice samples drilled from glaciers or ice sheets in which past climate and atmospheric data have been preserved.

2 Reading 04

When exactly did the issue of climate change begin? This chapter answers the question by examining the progress we have made in understanding and addressing climate change and by looking at the roles that scientific discoveries, government policies, and advancing technologies have played in this progress.

Discovering Climate's Past:

Analyses of Antarctic ice cores reveal that over the past 420,000 years, CO_2 levels and atmospheric temperatures have fluctuated closely together, providing critical insights into Earth's climate history. NASA scientist James Hansen's 1988 U.S. Senate testimony highlighted this connection between greenhouse gases and climate change, warning that it is human-caused greenhouse gas emissions that are driving global warming.

Turning Points in Climate Action:

The ozone layer is a protective blanket that shields Earth from harmful ultraviolet (UV) radiation. In 1985, scientists discovered significant depletion of the ozone layer over the South Pole, indicating that it was primarily caused by chlorofluorocarbons (CFCs) used in aerosols and refrigerators. This discovery led to the 1987 Montreal Protocol, a global agreement to phase out CFCs. As a result, the ozone layer began to recover, highlighting the importance of international cooperation and of raising awareness about climate change.

Innovations for a Sustainable Future:

Energy reform has been a critical driver of scientific and technological progress. The invention of the lithium-ion battery in 1985 revolutionized energy storage, paving the way for advancements in portable electronics and electric vehicles. At the same time, significant progress in renewable energy, exemplified by the UK's achievements in wind power in 1991, has been pivotal in accelerating the transition to sustainable-energy systems.

Understanding and Responding to Climate Change:

The Intergovernmental Panel on Climate Change (IPCC), established in 1988, plays a key role in evaluating climate science and informing policymakers. Its 1990 report identified human-driven greenhouse gases as the primary cause of global warming, leading to the United Nations Framework Convention on Climate Change (UNFCCC). Subsequent reports have influenced policies like the Kyoto Protocol and have expanded knowledge on issues such as rising sea levels and Earth's climate history.

Challenges to Biodiversity and Marine Life:

Rising CO_2 levels in the planet's atmosphere increase the acidity of the world's oceans, threatening coral reefs and shell-forming marine species like oysters and clams. These changes harm marine ecosystems and highlight how climate change disrupts biodiversity. Scientists linked such disruptions to human activity in 1992 and showed beyond a doubt the interconnectedness of ecosystems and climate.

Legislative and International Efforts for Climate Mitigation:

The 1994 UNFCCC, ratified by 197 nations, was the first international treaty to combat climate change by limiting greenhouse-gas emissions. The treaty laid the foundation for the 1997 Kyoto Protocol, which set binding emission-reduction targets for industrialized countries, marking a significant step in global climate governance.

Technological Advances and the Future of Energy:

Toyota's production of the first mass-market hybrid vehicle in 1997 marked the start of a shift away from fossil fuels. Since then, electric vehicle (EV) technology has advanced rapidly.

Climate Science in Action:

A 2003 study in Nature linked the recent devastating European heatwave to climate change, pioneering the field of study known as "extreme-event attribution," which quantifies global warming's impact on natural disasters. Meanwhile, research conducted during the 2007 International Polar Year revealed that polar regions are warming at with the resulting melting of polar ice twice the global rate, threatening ecosystems and iconic species like polar bears. Photos of struggling and starving polar bears published at this time shocked people around the world.

The Impact of Climate Change on Nature and Humanity:

A 2019 UN report warned that climate change and human activities have caused a sharp decline in biodiversity, putting up to one million plant and animal species at risk of extinction. Habitat destruction, air and water pollution, overexploitation of natural resources, invasive species, and climate change are driving this loss, putting ecosystems and human livelihoods at dire risk. The report, authored by 145 experts, calls for immediate global action to curb this disastrous decline in biodiversity.

Looking Forward to a Sustainable Future:

In 2019, the UK became the first major economy to legislate a net-zero emissions target by 2050. Unfortunately, the above-mentioned 2022 IPCC report showed the irreversible effects of climate change, including more frequent and more severe extreme weather events. A predicted 1.5°C temperature rise by 2040 will worsen heatwaves and increase the frequency of storms and droughts. This report underscored our urgent need for global cooperation and technological innovation to mitigate climate change and enable a sustainable future.

In a nutshell: Immediate and bold action is essential if we are to protect biodiversity, ecosystems, and human livelihoods and ensure a sustainable future.