

# How Does Human Thinking Activity Impact the Health and Stability of The Atmosphere?

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**Abstract:** This article explores the impact of human activities on the health and stability of the atmosphere, including greenhouse gas and air pollutant emissions, climate change, and atmospheric circulation changes. These issues not only affect ecosystems and economic development but also directly threaten human health and survival. To protect the health and stability of the atmosphere, comprehensive measures are needed to reduce emissions, strengthen monitoring and management, promote public awareness and education. Future research directions include atmospheric simulation and prediction, pollution source analysis and control, ecosystem and biodiversity research, health management and risk assessment, transport and transformation mechanism research, environmental quality monitoring technology research, aerosol research, greenhouse gas emission and emission reduction technology research, environmental policy assessment, and research on the relationship between health and climate change. Only by taking measures and strengthening research, international cooperation, and public participation can the health and sustainable development of the atmosphere truly be achieved.

**Keywords:** Human thinking, Atmosphere, Health, Stability.

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## 1. Introduction

### 1.1. Research Background and Significance

With the development of human society, our impact on the natural environment has become increasingly significant. The atmosphere is one of the essential environments for the Earth's life activity. However, due to the continuous increase in human activities, the health and stability of the atmosphere have been seriously threatened. In the past few decades, human activities such as greenhouse gas emissions and atmospheric pollutant emissions have significantly impacted the atmosphere, resulting in climate change, atmospheric circulation changes, and other issues.

Therefore, studying how human thinking activity impacts the health and stability of the atmosphere has important practical significance and scientific value. Firstly, it helps us better understand the changes in the atmosphere and its impact on human beings and ecosystems. Secondly, it provides a scientific basis for formulating environmental protection policies and measures, helping us protect the health and stability of the atmosphere. Finally, it also provides new ideas and directions for future atmospheric research, promoting our in-depth understanding and exploration of the atmosphere.

### 1.2. Article Structure

This article will analyze the impact of human thinking activity on the atmosphere from three aspects: chemistry, physics, and biology. The second part will explore the chemical impact of human activities on the atmosphere, including greenhouse gas emissions, atmospheric pollutant emissions, acid rain, and ozone layer depletion. The third part will introduce the physical impact of human activities on the atmosphere, including climate change, atmospheric circulation changes, and atmospheric temperature changes. The fourth part will discuss the biological impact of human activities on the atmosphere, including the impact of climate

change on ecosystems, the impact of air pollution on human health, and the impact of light pollution on the biological clock. In the fifth part, we will propose methods to improve the health of the atmosphere and future research directions. Finally, in the conclusion, we will summarize the main content of this article and emphasize that humans should take action to protect the health and stability of the atmosphere.

## 2. The Chemical Impact of Human Thinking Activity on the Atmosphere

The chemical impact of human thinking activities on the atmosphere is a long-standing issue. With the acceleration of industrialization and urbanization, people are paying more attention to the chemical impact on the atmosphere. Among them, greenhouse gas emissions and atmospheric pollution emissions are the most serious problems.

Greenhouse gas emissions cause global surface temperature to rise, leading to rising sea levels, melting glaciers, and extreme weather events. Meanwhile, atmospheric pollution emissions lead to acid rain, which causes serious harm to the environment and ecosystems. In addition, these pollutants can also damage the ozone layer, leading to increased UV radiation that poses health risks to humans and other living organisms.

In addition to greenhouse gas and atmospheric pollution emissions, human thinking activities can also cause adverse climate changes, such as droughts, floods, and other extreme weather events. These climate changes can have serious impacts on human society and ecosystems, including food supply, water resource management, and ecosystem balance.

To address these issues, we need to adopt effective environmental protection measures. For example, reducing greenhouse gas and pollution emissions, promoting the development of renewable energy, strengthening environmental monitoring and governance, and promoting sustainable agricultural and industrial production methods.

Only through global cooperation and joint efforts can we protect the health and stability of the atmosphere and provide

a better future for humans and other living organisms.

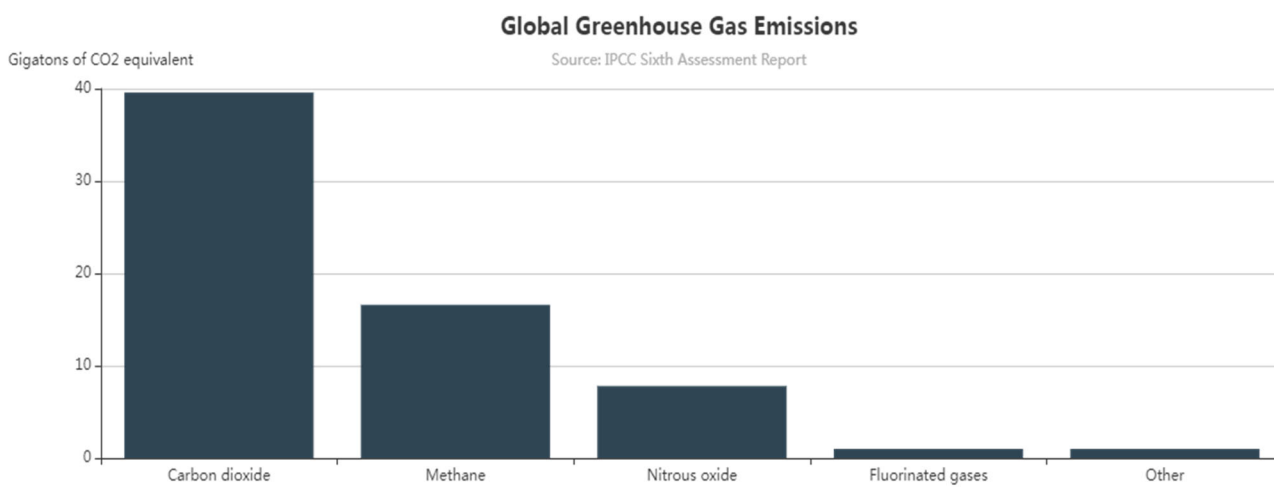


**Figure 1.** The Chemical Impact of Human Thinking Activity on the Atmosphere

### 2.1. Greenhouse Gas Emissions

Due to the continuous increase in human activities, the global concentration of greenhouse gases has reached its highest level since the industrial revolution. Carbon dioxide is the most significant greenhouse gas, accounting for about

70% of total global greenhouse gas emissions. Human activities mainly release carbon dioxide through the combustion of fossil fuels such as coal, oil, and natural gas. In addition, methane, fluorocarbons, and other greenhouse gases are also important, and their emissions mainly come from agriculture, industry, and transportation.



**Figure 2.** Greenhouse Gas Emissions

Greenhouse gas emissions have caused the Earth's climate to warm, which has had a significant impact on ecosystems and economic development. Global temperature rise has led to glacier melting, sea-level rise, and increased extreme weather events, posing a threat to human survival and development. In addition, greenhouse gas emissions can also cause atmospheric pollution problems such as acid rain and photochemical smog, which pose a hazard to human health and ecosystems.

To reduce greenhouse gas emissions, we need to take a series of measures, including reducing the use of fossil fuels, improving energy efficiency, and developing clean energy. Additionally, it is necessary to strengthen monitoring and

management, develop corresponding policies and regulations, promote public awareness and education, and work together to protect the health and stability of the atmosphere.

### 2.2. Atmospheric Pollutant Emissions

Air pollutants mainly come from human activities such as factories, motor vehicles, and power plants. Among them, sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) are the main atmospheric pollutants. They react with water vapor, oxygen, and other substances in the atmosphere to form secondary pollutants such as nitric acid and sulfuric acid, which have serious impacts on human health and the environment.

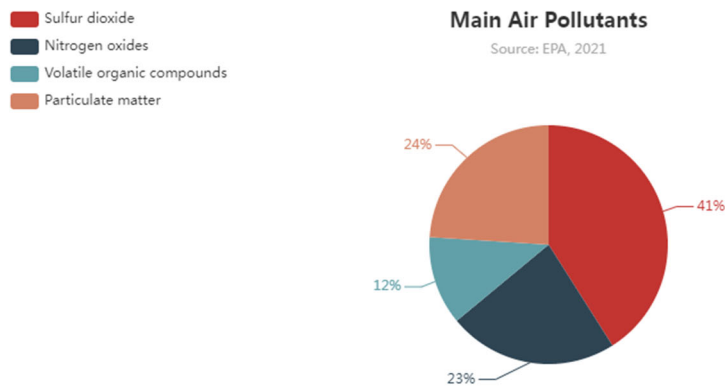


Chart-3

Figure 3. Main Air Pollutants

The impact of air pollutants on human health mainly includes respiratory diseases, cardiovascular diseases, cancer, etc. In addition, air pollution can also harm plants and animals and damage the stability of the atmosphere. For example, the emissions of sulfur dioxide and nitrogen oxides can cause acid rain formation, which damages soil and water resources and also has an impact on ecosystems.

To reduce atmospheric pollutant emissions, we need to take a series of measures, including strengthening supervision and management, improving energy efficiency in industry and transportation, promoting clean energy, etc. Additionally, it is necessary to enhance public education and awareness, encourage individuals to take environmental protection

actions, and reduce personal and household pollution emissions. Through joint efforts, we can improve the quality of the atmospheric environment and protect the health and stability of the atmosphere.

### 2.3. Acid Rain and Ozone Layer Depletion

Acid rain is a precipitation caused by pollutants in the atmosphere, which has higher acidity than normal rainfall. Acid rain is mainly caused by emissions of pollutants such as sulfur dioxide and nitrogen oxides. The impact of acid rain on ecosystems includes damage to forests, lakes, and soils. In addition, acid rain can also harm human health, causing respiratory and skin diseases.

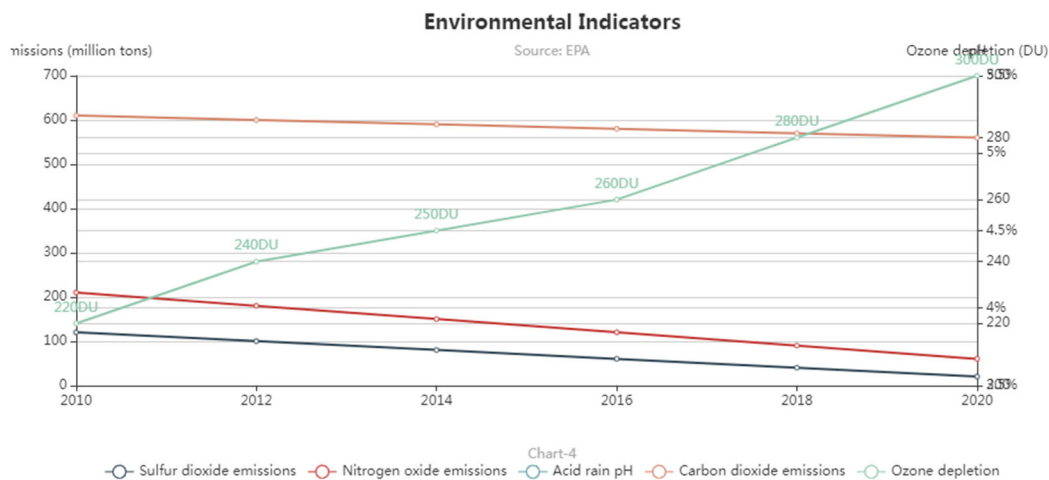


Chart-4

Figure 4. Environmental Indicators

To reduce the formation of acid rain, we need to take a series of measures, including reducing emissions of sulfur dioxide and nitrogen oxides, using clean energy, strengthening environmental supervision, etc. Additionally, it is necessary to promote ecological agriculture, take measures to protect ecosystems, and reduce the impact of acid rain on ecosystems.

The ozone layer is an important protective layer in the atmosphere that can prevent harmful radiation such as UV rays from entering the Earth's surface. However, chemicals such as chlorofluorocarbons (CFCs) and halogenated hydrocarbons (HFCs) emitted by human activities can deplete the ozone layer, leading to a decrease in ozone concentration in the atmosphere. Ozone depletion can increase UV radiation, posing a threat to human health and ecosystems.

To protect the ozone layer, the international community has developed the Montreal Protocol, which gradually eliminates harmful substances such as CFCs. Additionally, measures need to be taken to reduce the emissions of other ozone-depleting substances, such as controlling the use of HFCs and other chemicals. Through joint efforts, we can protect the ozone layer, reduce UV radiation, and protect human health and ecosystem stability.

In summary, the impact of human activities on the atmosphere is complex, and comprehensive measures are needed to reduce greenhouse gas and air pollutant emissions and protect the health and stability of the atmosphere.

### 3. The Physical Impact of Human Thinking Activity on the Atmosphere

Human thinking activity has had a broad and profound impact on the atmospheric environment. With the continuous growth of human activity, such as industrialization, urbanization, and transportation, our atmospheric environment is also constantly changing. These changes have significant effects on atmospheric composition, climate, atmospheric circulation, and temperature.

Firstly, human thinking activity leads to the emission of

large amounts of air pollutants, such as carbon dioxide, methane, and nitrogen oxides. These gases gradually accumulate in the atmosphere, forming the greenhouse effect, which causes an increase in surface temperature and, in turn, triggers climate change.

Secondly, human activity also has an important impact on atmospheric circulation. For example, deforestation and land use changes can affect local and global climate patterns, thereby altering atmospheric circulation. In addition, urbanization and transportation also generate large amounts of heat and mechanical energy, further affecting atmospheric circulation.

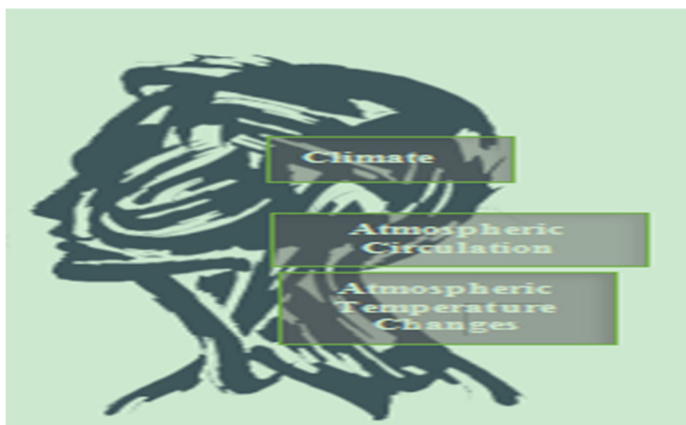


Figure 5. The Physical Impact of Human Thinking Activity on the Atmosphere

Finally, human thinking activity has also affected atmospheric temperature. As greenhouse gas emissions increase, atmospheric temperature gradually rises, leading to an increase in extreme weather events, such as heat waves, droughts, and floods.

In summary, human thinking activity has had a broad and profound impact on the atmospheric environment, including climate change, changes in atmospheric composition, atmospheric circulation, and temperature. We need to take these issues seriously and take proactive measures to reduce negative impacts and protect our atmospheric environment.

#### 3.1. Climate Change

Climate change refers to long-term changes in climate patterns, including global temperature rise, increased extreme weather events, precipitation and drought, etc. Human activities, such as emitting greenhouse gases and other pollutants, have changed the composition of the atmosphere,

leading to climate change. These changes have had serious impacts on ecosystems and economic development.

Global temperature rise has led to glacier melting and sea-level rise, threatening the survival and development of coastal areas. Climate change can also cause more extreme weather events such as droughts and floods, affecting agricultural production and urban infrastructure. Additionally, climate change can lead to a reduction in biodiversity and species extinction.

To mitigate the impact of climate change, we need to take a series of measures, including reducing greenhouse gas emissions, improving energy efficiency, developing clean energy, promoting low-carbon lifestyles, etc. Additionally, it is necessary to strengthen monitoring and management, develop corresponding policies and regulations, promote public awareness and education, and work together to protect the health and stability of the atmosphere.

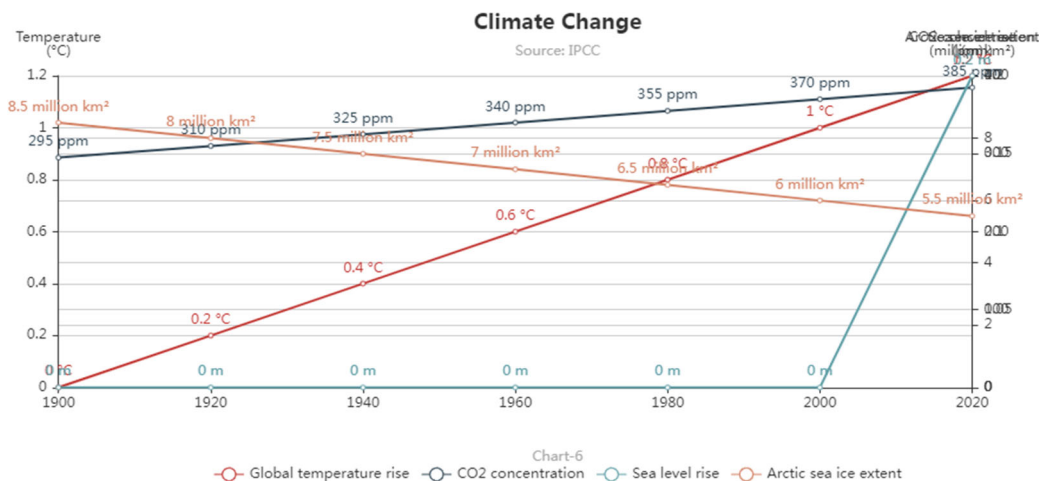


Figure 6. ClimateChange

At the international level, countries need to strengthen cooperation to jointly address the issue of climate change. In 2015, the Parties to the United Nations Framework Convention on Climate Change reached the Paris Agreement, aiming to limit the global temperature rise to within 2 degrees Celsius. Each country should develop specific emission reduction plans based on its own situation and actively implement them. Through joint efforts, we can protect the Earth's ecological environment and contribute to sustainable development and the future of humanity.

In addition to the above measures, we can also take other measures to address climate change. For example, we can strengthen carbon sink management, absorb and store greenhouse gases such as carbon dioxide through the protection and restoration of ecosystems such as forests and wetlands. Additionally, we can develop a low-carbon economy, promote sustainable development models, and reduce resource consumption and environmental pollution.

In the process of addressing climate change, we also need to pay attention to the differences between countries and regions. Developed countries should bear more responsibilities and obligations to help developing countries improve their ability and level of response to climate change.

At the same time, we also need to consider the development stage and economic conditions of different countries and regions and develop corresponding policies and measures.

In summary, addressing climate change is a global challenge that requires the joint efforts of all countries. Through taking comprehensive measures, we can mitigate the impact of climate change, protect the health and stability of the atmosphere, and benefit the sustainable development and future of humanity.

### 3.2. Atmospheric Circulation Changes

Atmospheric circulation refers to the movement of air currents in the atmosphere, including meridional and zonal airflows. Human activities have had a certain impact on atmospheric circulation, mainly due to changes in temperature and humidity in the atmosphere. For example, human activities that lead to greenhouse gas emissions can cause an increase in atmospheric temperature, which can affect atmospheric circulation. Additionally, human activities can also cause changes in surface cover, such as urbanization and deforestation, which can also affect atmospheric circulation.

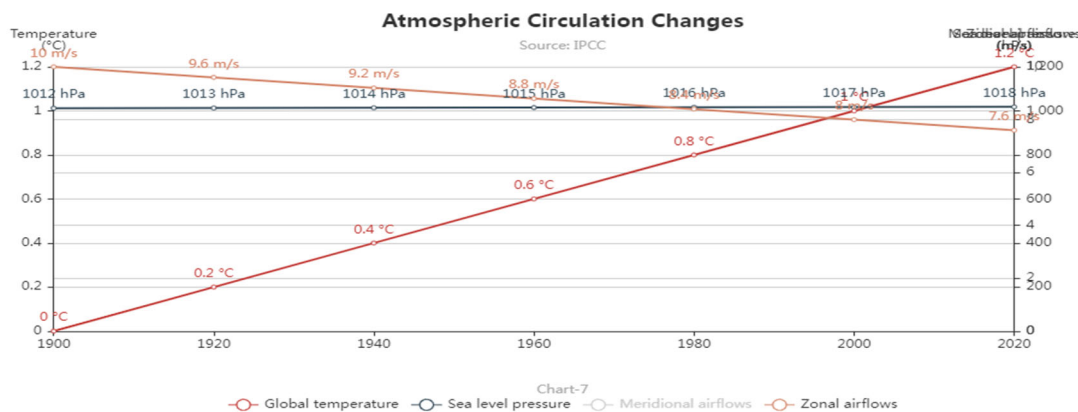


Figure 7. Atmospheric Circulation Changes

Changes in atmospheric circulation have an important impact on climate and weather events. For example, the El Niño phenomenon is a change in atmospheric circulation that can cause global climate changes, including changes in temperature and precipitation. Additionally, changes in atmospheric circulation can also cause extreme weather events such as storms, droughts, and floods.

To address the impact of atmospheric circulation changes, we need to take a series of measures to reduce the impact of human activities on atmospheric circulation. These mainly include the following:

1. Reduce greenhouse gas emissions: Greenhouse gas emissions are one of the main causes of atmospheric temperature rise. Therefore, we need to take measures to reduce greenhouse gas emissions, such as promoting clean energy, improving energy efficiency, and developing low-carbon transportation.

2. Protect the ecological environment: The destruction of the ecological environment can also affect atmospheric circulation. For example, deforestation can cause changes in surface cover and affect atmospheric circulation. Therefore, we need to strengthen ecological environment protection, promote ecological agriculture, and implement forest

protection measures.

3. Strengthen monitoring and warning: Strengthen the monitoring and warning of atmospheric circulation, timely discover and predict climate changes and extreme weather events, and provide effective prevention and response measures for society.

4. Promote low-carbon lifestyles: Promote low-carbon lifestyles, reduce the impact of human activities on atmospheric circulation, encourage walking, cycling, and public transportation, and reduce the use of motor vehicles.

5. Strengthen international cooperation: Climate change and atmospheric circulation changes are global issues that require joint efforts from all countries. Therefore, we need to strengthen international cooperation to jointly research and address climate change and atmospheric circulation changes.

6. Develop and implement policies and regulations: Governments should develop and implement policies and regulations to reduce the impact of human activities on atmospheric circulation. These policies and regulations can include emission reduction targets, incentives for clean energy development, and penalties for environmental violations.

7. Promote education and awareness: Education and

awareness campaigns can help individuals and communities understand the impact of their actions on atmospheric circulation and take steps to reduce their carbon footprint. Governments and organizations can also promote public awareness through media campaigns, educational programs, and community outreach initiatives.

8. Invest in research and innovation: Continued investment in scientific research and technological innovation can help us better understand atmospheric circulation changes and develop new solutions to address climate change. This includes research into renewable energy sources, carbon capture and storage technologies, and climate modeling and prediction.

9. Support adaptation measures: While mitigation efforts are important for reducing the impact of human activities on atmospheric circulation, it is also crucial to support adaptation measures to help communities and ecosystems adapt to the changes that are already occurring. This can include measures such as improving water management, developing drought-resistant crops, and strengthening infrastructure to withstand extreme weather events.

10. Address equity and justice: Climate change and atmospheric circulation changes disproportionately affect vulnerable communities and developing countries, who often have contributed the least to the problem. Therefore, it is important to address equity and justice in our response to these issues, ensuring that the burden of action and the benefits of mitigation and adaptation are shared fairly and equitably across all communities and nations.

11. Engage with businesses and industries: Businesses and industries have a significant impact on atmospheric circulation through their operations and supply chains. Therefore, it is important to engage with them to encourage sustainable practices, reduce emissions, and promote clean energy development.

12. Take individual action: While government policy and international cooperation are essential for addressing atmospheric circulation changes, individual actions can also make a difference. This includes reducing energy consumption, using public transportation or electric vehicles, reducing waste, and eating a plant-based diet. By making small changes in our daily lives, we can collectively contribute to a more sustainable future.

13. Foster collaboration between sectors: Addressing atmospheric circulation changes requires collaboration across sectors, including government, business, civil society, and academia. By fostering collaboration and sharing knowledge and resources, we can develop more effective solutions to address the challenges of climate change and atmospheric circulation changes.

14. Support international agreements and initiatives: The Paris Agreement and other international agreements and initiatives provide a framework for addressing climate change and atmospheric circulation changes at a global level. It is important to support these agreements and initiatives and work towards their effective implementation to achieve our collective goals.

15. Encourage sustainable urban planning: Urbanization has a significant impact on atmospheric circulation, with cities contributing a large share of global greenhouse gas emissions. Encouraging sustainable urban planning, such as promoting public transportation, green spaces, and energy-efficient buildings, can help reduce the impact of cities on atmospheric circulation and mitigate the effects of climate

change.

16. Promote circular economy: A circular economy is an economic model that aims to minimize waste and maximize resource efficiency by keeping materials in use for as long as possible. Promoting a circular economy can help reduce the impact of human activities on atmospheric circulation by reducing the extraction of raw materials, minimizing waste, and reducing greenhouse gas emissions from production and consumption.

17. Encourage sustainable agriculture: Agriculture is a significant contributor to greenhouse gas emissions and can also have an impact on atmospheric circulation through land use changes and deforestation. Encouraging sustainable agriculture practices, such as reducing tillage, using cover crops, and promoting agroforestry, can help reduce emissions and support adaptation to climate change.

18. Invest in green infrastructure: Green infrastructure, such as green roofs, permeable pavement, and urban forests, can help mitigate the impact of human activities on atmospheric circulation by reducing the urban heat island effect, improving air quality, and reducing stormwater runoff. Investing in green infrastructure can also provide economic and social benefits, such as job creation and improved health outcomes.

19. Address the root causes of environmental degradation: Environmental degradation, such as deforestation and soil erosion, can have a significant impact on atmospheric circulation. Addressing the root causes of these issues, such as unsustainable consumption patterns and economic systems that prioritize growth over sustainability, is essential for achieving long-term solutions to atmospheric circulation changes and climate change.

20. Promote international cooperation on climate finance: Climate finance is essential for supporting developing countries in their efforts to mitigate and adapt to climate change. Promoting international cooperation on climate finance, including increasing funding and improving access to finance, can help ensure that vulnerable communities have the resources they need to address atmospheric circulation changes and other impacts of climate change.

21. Foster public-private partnerships: Public-private partnerships can play an important role in addressing atmospheric circulation changes by bringing together the strengths of government, business, and civil society to develop innovative solutions. These partnerships can focus on areas such as renewable energy development, sustainable land use practices, and green infrastructure.

22. Promote sustainable tourism: Tourism can have a significant impact on atmospheric circulation, particularly through air travel and the use of energy-intensive facilities such as hotels and resorts. Promoting sustainable tourism practices, such as promoting eco-tourism and reducing energy consumption in tourism facilities, can help reduce the impact of tourism on atmospheric circulation and support sustainable development.

23. Support research into geoengineering: While mitigation and adaptation efforts are essential for addressing atmospheric circulation changes, some researchers are also exploring the potential of geoengineering as a way to directly manipulate the Earth's atmosphere. Supporting research into geoengineering can help us better understand its potential risks and benefits and inform policy decisions on this controversial topic.

24. Address social and economic inequalities: Social and

economic inequalities can exacerbate the impacts of atmospheric circulation changes, particularly for vulnerable communities. Addressing these inequalities through policies that promote social justice and economic equality can help ensure that all communities have the resources they need to adapt to and mitigate the effects of climate change.

25. Encourage community-based action: Community-based action can play an important role in addressing atmospheric circulation changes by empowering individuals and communities to take action in their own neighborhoods and cities. This can include initiatives such as community gardens, neighborhood clean-up campaigns, and local renewable energy projects.

26. Increase public participation: Engaging the public in efforts to address atmospheric circulation changes is essential for building support and creating momentum for action. Governments, organizations, and businesses can increase public participation through public consultations, citizen science initiatives, and community engagement programs.

27. Address food waste: Food waste is a significant contributor to greenhouse gas emissions and can also have an impact on atmospheric circulation through land use changes and deforestation. Addressing food waste through initiatives such as composting and food recovery programs can help reduce emissions and support sustainable land use practices.

28. Promote green jobs: Investing in green jobs, such as those in renewable energy development, green infrastructure construction, and sustainable agriculture, can help create employment opportunities while also supporting efforts to address atmospheric circulation changes and climate change.

29. Foster international cooperation on technology transfer: Technology transfer from developed to developing countries can help facilitate the adoption of clean energy technologies and support sustainable development. Fostering international cooperation on technology transfer can help ensure that all countries have access to the technologies they need to address atmospheric circulation changes and mitigate the effects of climate change.

30. Support nature-based solutions: Nature-based solutions, such as reforestation and wetland restoration, can help

mitigate the impacts of atmospheric circulation changes by sequestering carbon and supporting biodiversity. Supporting nature-based solutions can also provide additional benefits such as improved water quality, flood control, and recreation opportunities.

In addition to the measures mentioned above, we can also take other measures to address atmospheric circulation changes. For example, we can strengthen international cooperation and jointly research and address atmospheric circulation change issues. At the same time, we can also strengthen technological innovation, promote the development of clean energy and environmental protection technologies, and reduce the impact of human activities on atmospheric circulation.

In the process of addressing atmospheric circulation changes, we also need to consider the differences between regions and countries. Different regions and countries have different natural conditions, levels of economic development, and environmental issues, requiring targeted policies and measures. At the same time, we also need to strengthen international cooperation to jointly address global environmental issues.

In summary, addressing atmospheric circulation changes is a complex system engineering project that requires joint efforts and comprehensive measures from all parties. Through measures such as strengthening monitoring and warning, promoting low-carbon lifestyles, and strengthening ecological environment protection, we can reduce the impact of human activities on atmospheric circulation, protect the health and stability of the atmosphere, and promote sustainable development and a better future for humanity.

### 3.3. Atmospheric Temperature Changes

Human activities that emit greenhouse gases have altered the Earth's climate, which has subsequently impacted atmospheric temperatures. The rise in global temperatures has caused numerous environmental issues, such as sea level rise, melting glaciers, and an increase in extreme weather events. These changes have had severe effects on both ecosystems and economic development.

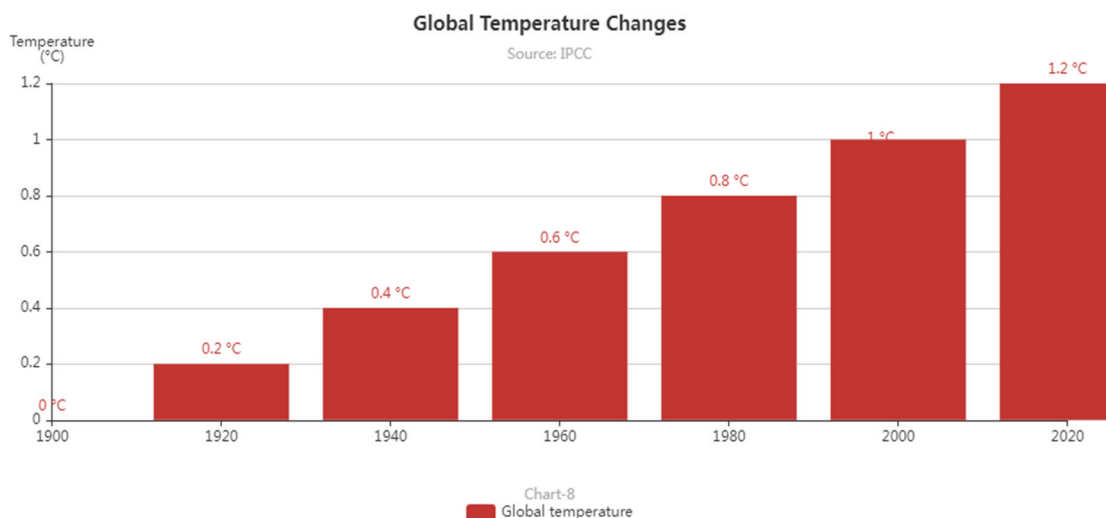


Figure 8. Global Temperature Changes

Changes in atmospheric temperature also affect biodiversity and ecosystem functionality. For instance, temperature increases can result in alterations to the distribution and life cycles of many organisms within

ecosystems, which in turn affects the stability of those systems. Additionally, temperature increases can cause problems such as coral reef death and a decrease in fish habitats within the oceans.

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development of clean energy, we can reduce the impact of human activities on atmospheric temperature, protect the health and stability of the atmosphere, and promote sustainable development and a better future for humanity.

#### 4. The Biological Impact of Human Thinking Activities on the Atmosphere

Human thinking activities have profound impacts on the environment, including the atmosphere. The biological impact of these activities is a growing concern as we continue to witness the effects of climate change, air pollution, and light pollution on ecosystems and human health. In this paper, we will explore the three major impacts of human thinking activities on the atmosphere: the impact of climate change on ecosystems, the impact of air pollution on human health, and the impact of light pollution on biological clocks. These issues require immediate attention and action from individuals, organizations, and governments around the world to mitigate their negative effects on the environment and promote a sustainable future for all living beings.



**Figure 9.** The Biological Impact of Human Thinking Activities on the Atmosphere

The impact of climate change on ecosystems is a result of the increase in temperature and changes in precipitation patterns caused by human activities such as burning fossil fuels and deforestation. These changes are leading to the loss of biodiversity, disruption of ecosystems, and extinction of species. It is essential to reduce our carbon footprint and promote sustainable practices to mitigate the negative effects of climate change on ecosystems.

Air pollution is another significant impact of human thinking activities on the atmosphere. The increase in emissions from transportation, industry, and energy production has led to high levels of air pollution, which can cause respiratory problems, heart disease, and even cancer. It is crucial to reduce our reliance on fossil fuels and promote the use of clean energy sources to improve air quality and protect human health.

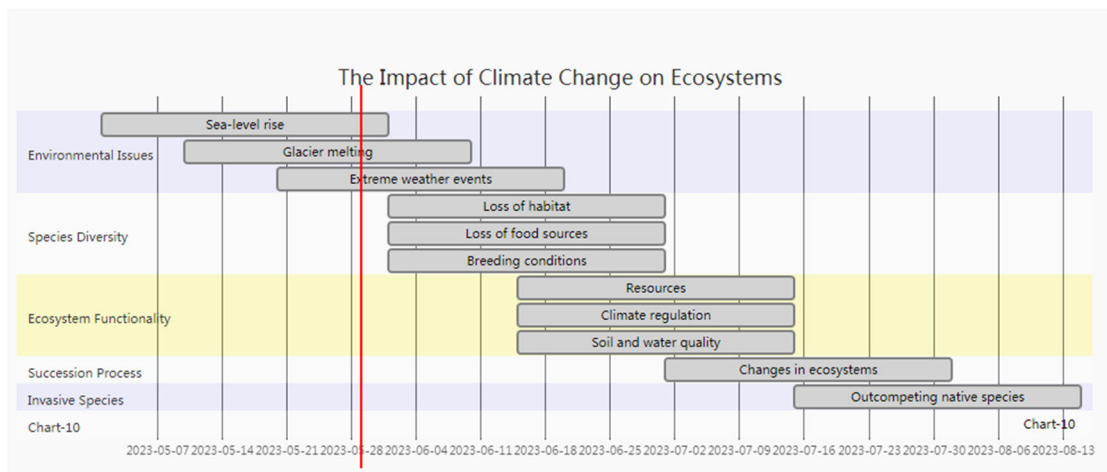
Lastly, light pollution is disrupting the biological clock of many species, including humans. Exposure to artificial light at night can interfere with the natural circadian rhythm, which can lead to sleep disorders, obesity, and other health problems.

It is necessary to reduce light pollution by using energy-efficient lighting and limiting unnecessary outdoor lighting.

In conclusion, the biological impact of human thinking activities on the atmosphere is undeniable. It is vital that we take immediate action to address the negative effects of climate change, air pollution, and light pollution on ecosystems and human health. By promoting sustainable practices and reducing our carbon footprint, we can create a healthier and more sustainable future for all living beings.

##### 4.1. The Impact of Climate Change on Ecosystems

Climate change has a wide-ranging impact on ecosystems. The rise in global temperatures has caused numerous environmental issues, such as sea-level rise, glacier melting, and an increase in extreme weather events. These changes have had severe effects on both ecosystems and economic development.



**Figure 10.** The Impact of Climate Change on Ecosystems

Climate change can alter the distribution and life cycles of species, thereby affecting the stability of ecosystems. For example, temperature increases can lead to a reduction or disappearance of habitats for some animals and plants, putting them at risk of extinction. In addition, climate change may also cause changes in ecological relationships between species, such as food chains and interactions.

The impact of climate change on ecosystems is also reflected in the following aspects:

1. Climate change leads to a reduction in species diversity within ecosystems. Due to the changes in temperature, precipitation, and climate events caused by climate change, many species may lose basic resources such as habitats, food sources, and breeding conditions, leading to a decrease in their numbers or even extinction.

2. Climate change affects the functionality of ecosystems. The functionality of ecosystems includes providing resources such as food, water sources, and oxygen, as well as regulating the climate, maintaining soil and water quality, and so on. Climate change can alter these functions, affecting the stability and sustainability of ecosystems.

3. Climate change affects the succession process of ecosystems. The succession of ecosystems refers to the changes that occur in ecosystems over time. Climate change may accelerate or slow down the sIn addition, climate change can also lead to the spread of invasive species, which can outcompete native species and disrupt ecosystem dynamics. This can have cascading effects throughout the ecosystem, impacting other species and altering ecosystem functions.

Furthermore, the impacts of climate change on ecosystems can also have social and cultural implications. Many indigenous communities rely on natural resources for their livelihoods and cultural practices, and changes to ecosystems can threaten these traditions and ways of life. Climate change can also exacerbate existing social inequalities, as marginalized communities may be more vulnerable to the impacts of environmental degradation and resource depletion.

To address the impacts of climate change on ecosystems, it is important to take a holistic approach that incorporates both ecological and social considerations. This includes promoting sustainable land use practices, protecting biodiversity hotspots, and supporting the rights and needs of indigenous communities. By working together to address the impacts of climate change on ecosystems, we can ensure a healthier and more resilient planet for all.uccession process, making the ecosystem more fragile and unstable.

To address the impact of climate change on ecosystems, it is necessary to take a series of measures to protect the stability and sustainability of ecosystems. These measures include:

1. Protecting ecosystems: Strengthening environmental protection measures to protect the integrity and stability of ecosystems and reduce human activities that damage ecosystems.

2. Enhancing monitoring and early warning: Strengthening the monitoring and early warning of climate change on ecosystems to identify and predict trends and patterns of ecosystem changes in a timely manner.

3. Promoting low-carbon lifestyles: Promoting low-carbon lifestyles to reduce the impact of human activities on climate change and ecosystems. This includes encouraging walking, cycling, and public transportation, and reducing the use of motor vehicles.

4. Strengthening international cooperation: Strengthening international cooperation to jointly address global climate change and ecosystem issues, sharing technology and experience, and promoting global ecological civilization construction.

5. Supporting conservation efforts: Supporting conservation efforts to protect vulnerable species and habitats, and promoting the restoration of degraded ecosystems.

6. Promoting sustainable land use practices: Promoting sustainable land use practices, such as reducing deforestation, promoting reforestation, and implementing sustainable agriculture practices, to reduce greenhouse gas emissions and protect ecosystems.

7. Encouraging renewable energy development: Encouraging the development of renewable energy sources, such as solar and wind power, to reduce reliance on fossil fuels and mitigate the impact of climate change on ecosystems.

8. Empowering local communities: Empowering local communities to participate in decision-making processes related to environmental protection and management, and supporting their efforts to implement sustainable practices.

9. Investing in research and development: Investing in research and development to better understand the impacts of climate change on ecosystems and develop new technologies and strategies for mitigating these impacts.

10. Educating the public: Educating the public about the importance of protecting ecosystems and taking action to mitigate climate change, and promoting behavior changes that support sustainable practices.

11. Strengthening policy and regulation: Strengthening policy and regulation to incentivize sustainable practices and discourage activities that harm ecosystems, such as implementing carbon pricing mechanisms and enforcing environmental laws.

12. Fostering international cooperation: Fostering international cooperation to address the root causes of climate change, such as reducing greenhouse gas emissions and promoting sustainable development, and supporting developing countries in their efforts to adapt to the impacts of climate change.

13. Incorporating ecosystem services into decision-making: Incorporating the value of ecosystem services, such as carbon sequestration and water filtration, into decision-making processes related to land use, infrastructure development, and other activities that impact ecosystems.

14. Building resilience: Building resilience in ecosystems to better withstand the impacts of climate change, such as by restoring degraded habitats, implementing fire management strategies, and promoting biodiversity.

15. Addressing social and environmental justice: Addressing social and environmental justice issues related to the impacts of climate change on ecosystems, such as ensuring equitable access to natural resources and supporting the rights of indigenous communities.

16. Implementing adaptive management: Implementing adaptive management strategies that allow for ongoing monitoring and adjustment of conservation and management practices in response to changing environmental conditions.

17. Supporting public-private partnerships: Supporting public-private partnerships to promote sustainable practices and invest in conservation efforts, such as through corporate social responsibility initiatives and public-private partnerships for ecosystem restoration.

18. Encouraging green infrastructure development: Encouraging the development of green infrastructure, such as urban green spaces and green roofs, to promote biodiversity, reduce urban heat islands, and mitigate the impacts of climate change on ecosystems.

19. Promoting circular economy principles: Promoting circular economy principles, such as reducing waste and promoting resource efficiency, to reduce the impact of human activities on ecosystems and promote sustainable consumption and production patterns.

20. Strengthening environmental education and awareness: Strengthening environmental education and awareness programs to promote a greater understanding of the importance of ecosystems and the impact of climate change, and to foster a sense of personal responsibility for protecting the environment.

By incorporating these measures into our efforts to address the impact of climate change on ecosystems, we can build a more comprehensive and effective approach to protecting the health and resilience of our planet's natural systems. These efforts require collaboration and cooperation across different sectors and levels of society, and a commitment to long-term action and investment in sustainable practices. It is essential to prioritize the protection and restoration of ecosystems as a critical component of global efforts to mitigate and adapt to the impacts of climate change, and to promote sustainable practices that support the health and resilience of our planet's natural systems.

Addressing the impact of climate change on ecosystems requires a comprehensive approach that addresses the social, economic, and environmental dimensions of the issue. By taking these additional measures, we can more effectively address the complex and interconnected challenges posed by climate change and ecosystem degradation. It is important to recognize that these efforts require collaboration and cooperation across different sectors and levels of society, and a commitment to long-term action and investment in sustainable practices. By working together to protect ecosystems and promote sustainability, we can ensure a healthy and prosperous future for ourselves and future generations.

## 4.2. The Impact of Air Pollution on Human Health

The impact of air pollution on human health mainly includes respiratory diseases, cardiovascular diseases, and cancer. For example, pollutants such as sulfur dioxide and nitrogen oxides can stimulate the respiratory system, leading to diseases such as coughing, asthma, and lung cancer. In addition, pollutants such as fine particulate matter and ozone can also cause health problems such as cardiovascular disease and stroke.

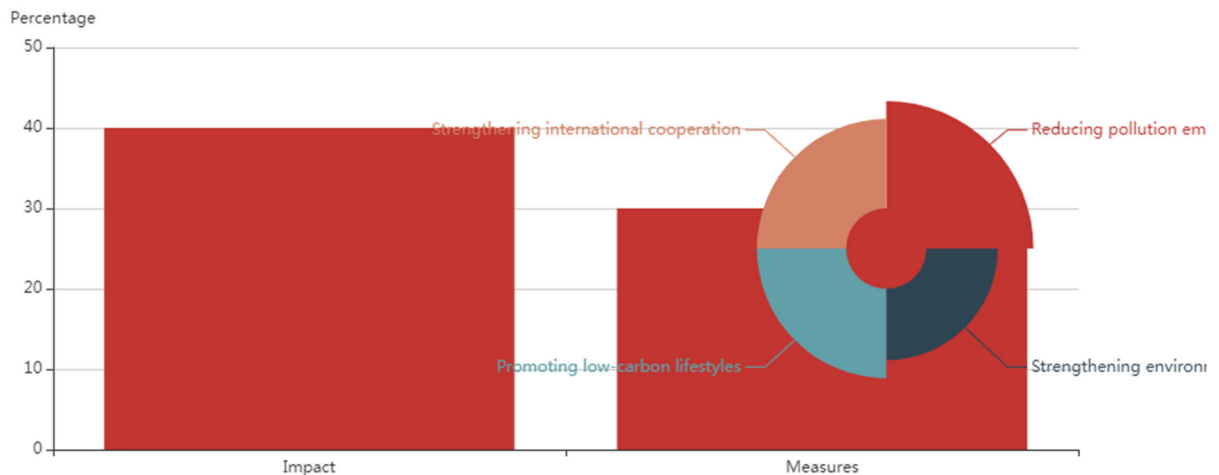


Figure 11. The Impact of Air Pollution on Human Health

The impact of air pollution on ecosystems is also significant. For example, acid rain can cause forest death and

the extinction of fish in lakes. In addition, air pollution can disrupt the stability of the earth's atmosphere, which can

affect the health and stability of ecosystems.

In addition to the above-mentioned impacts, air pollution may also have the following effects on human health:

1. **Neurological diseases:** Many air pollutants can cross the blood-brain barrier and enter the brain, leading to neurological diseases such as headaches, insomnia, and mood swings.

2. **Reproductive system diseases:** Air pollutants may also cause reproductive system diseases, such as male infertility and menstrual disorders in females.

3. **Immune system diseases:** Air pollution may also lead to immune system diseases, such as allergies and autoimmune diseases.

These additional impacts of air pollution on human health highlight the urgent need for effective measures to reduce and prevent air pollution. This includes promoting cleaner energy sources, encouraging sustainable transportation options, and implementing regulations and policies that limit emissions from industry and other sources.

In addition, addressing the impacts of air pollution on human health requires a focus on vulnerable populations, such as children, the elderly, and those with pre-existing health conditions. It is important to ensure equitable access to clean air and promote public awareness about the health risks of air pollution.

Furthermore, addressing the impacts of air pollution on human health also requires international cooperation and collaboration. Air pollution is a global issue that requires coordinated efforts from governments, organizations, and individuals around the world. By working together to reduce air pollution, we can protect human health and promote a healthier and more sustainable future for all.

To reduce the impact of air pollution on human health, a series of measures need to be taken to reduce air pollution. These measures mainly include the following:

1. **Reducing pollution emissions:** Measures should be taken to reduce pollution emissions in industry, transportation, households and other areas, such as strengthening pollution source regulation, promoting clean energy, improving energy efficiency, etc.

2. **Strengthening environmental monitoring:** Strengthening the monitoring of air pollution, timely discovering and solving pollution problems, and providing scientific basis for environmental governance.

3. **Promoting low-carbon lifestyles:** Promoting low-carbon lifestyles, reducing the impact of human activities on air pollution, such as encouraging walking, cycling, and public transportation, reducing the use of motor vehicles, etc.

4. **Strengthening international cooperation:** Strengthening international cooperation to jointly address global air pollution problems, share technology and experience, and promote global ecological civilization construction.

In summary, the impact of air pollution on human health is significant. By taking measures to reduce pollution emissions, strengthen environmental monitoring, promote low-carbon lifestyles, and strengthen international cooperation, we can reduce the impact of air pollution on human health, protect people's physical health, and promote sustainable development of society.

In addition to these measures, it is important to prioritize public education and awareness about the impact of air pollution on human health. This includes promoting individual actions that can reduce air pollution, such as reducing energy consumption, using public transportation, and properly disposing of waste.

Moreover, addressing the impact of air pollution on human health requires a multidisciplinary approach that involves collaboration between government agencies, healthcare professionals, and environmental organizations. This includes conducting research on the health effects of air pollution, developing effective policies and regulations to limit emissions, and providing adequate healthcare services for those affected by air pollution-related illnesses.

Finally, it is crucial to acknowledge the global nature of air pollution and the need for international cooperation to address this issue. By working together, countries can share knowledge and resources to develop effective strategies for reducing air pollution and protecting human health.

In conclusion, reducing the impact of air pollution on human health requires a comprehensive and coordinated effort from individuals, governments, and organizations around the world. By taking action to reduce pollution emissions, promote low-carbon lifestyles, and raise public awareness, we can protect the health of our communities and ensure a sustainable future for generations to come.

### 4.3. The Impact of Light Pollution on Biological Clocks

Light pollution refers to the interference caused by artificial light sources in the natural environment. The impact of light pollution on biological clocks is significant. Biological clocks are rhythms within organisms that regulate metabolic, sleep, and behavioral activities. Light pollution can disrupt the normal functioning of biological clocks and lead to physiological and behavioral changes in organisms.

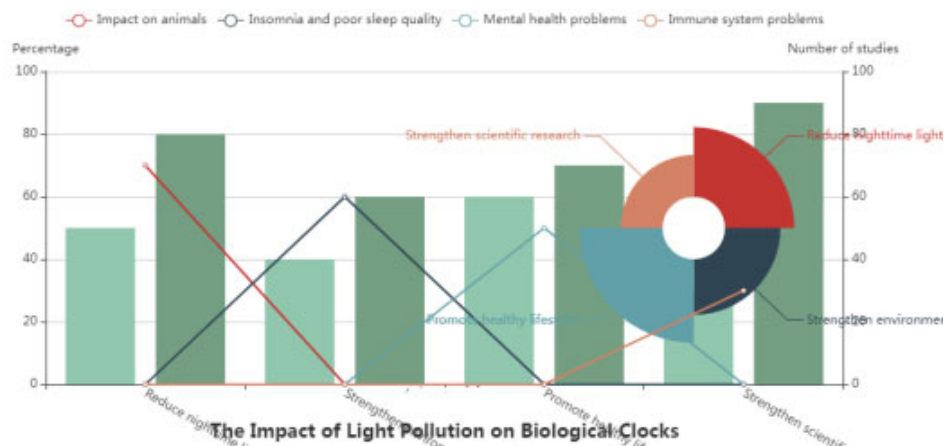


Figure 12. The Impact of Light Pollution on Biological Clocks

Light pollution affects many animals, such as birds, insects, and sea turtles. For example, light pollution can interfere with the migration and breeding behavior of birds, putting them at risk of survival. In addition, light pollution can affect the growth and reproduction of insects, which can have a ripple effect on the stability of entire ecosystems.

For humans, light pollution also has an impact on biological clocks. The following are the effects of light pollution on human health:

1. **Insomnia and poor sleep quality:** Long-term exposure to strong light can lead to disruption of the biological clock, affecting the sleep cycle of humans, making it difficult for people to fall asleep or causing a decrease in sleep quality.

2. **Mental health problems:** Light pollution can also have an impact on the mental health of humans, such as depression, anxiety, and other emotional problems.

3. **Immune system problems:** Light pollution can disrupt the normal operation of the human immune system, making the body more susceptible to infections and diseases.

To reduce the impact of light pollution on biological clocks, the following measures need to be taken:

1. **Reduce nighttime light pollution:** Reduce the use of nighttime light sources to avoid the impact of light pollution on biological clocks.

2. **Strengthen environmental monitoring:** Strengthen the monitoring of light pollution, timely discover and solve pollution problems, and provide scientific basis for environmental governance.

3. **Promote healthy lifestyles:** Promote healthy lifestyles, such as regular sleep habits and appropriate outdoor activities, which can help improve the functioning of biological clocks.

4. **Strengthen scientific research:** Strengthen scientific research on the impact of light pollution on biological clocks, and provide scientific basis for controlling light pollution.

In conclusion, the impact of light pollution on biological clocks is significant. By reducing the use of nighttime light sources, strengthening environmental monitoring, promoting healthy lifestyles, and enhancing scientific research, we can reduce the impact of light pollution on biological clocks, protect people's physical health, and promote sustainable development of society.

In addition, it is important to acknowledge the global nature of light pollution and the need for international cooperation to address this issue. Countries can work together to develop effective strategies for reducing light pollution and protecting biological clocks and human health.

Furthermore, addressing the impact of light pollution on biological clocks also requires collaboration between government agencies, urban planners, and healthcare professionals. This includes developing regulations and policies to control the intensity and timing of lighting, promoting the use of warm-colored lights, and providing healthcare services for those affected by light pollution-related illnesses.

Finally, public education and awareness about the impact of light pollution on biological clocks and human health are crucial. This includes educating individuals about the negative effects of light pollution and encouraging them to take action to reduce light pollution in their communities.

In conclusion, reducing the impact of light pollution on biological clocks requires a comprehensive and coordinated effort from individuals, governments, and organizations around the world. By taking action to reduce light pollution,

promote healthy lifestyles, and raise public awareness, we can protect the health of our communities and ensure a sustainable future for generations to come.

## 5. Future Outlook

Air pollution has become a serious problem that affects human health and the environment of the earth. It is crucial to take measures to improve the quality of the atmospheric environment in order to protect our health and ecological environment. This paper explores methods and future research directions for improving atmospheric health. We will introduce current methods, such as reducing pollutant emissions, improving energy efficiency, and promoting clean energy, which can effectively reduce the concentration of air pollutants and slow down the deterioration of the atmospheric environment. Additionally, we will look at future research directions, such as developing new types of clean energy and studying atmospheric chemical reactions, which can provide more sustainable and efficient methods for improving the atmospheric environment in the future. Through these efforts, we believe that we can achieve a healthier and more sustainable atmospheric environment, thus protecting the health of humans and the earth.

### 5.1. Methods to Improve Atmospheric Health

To improve atmospheric health, we need to adopt comprehensive measures to reduce greenhouse gas and air pollutant emissions. Specific methods include:

1. **Reduce greenhouse gas emissions.** Reduce greenhouse gas emissions through methods such as improving energy efficiency and promoting clean energy.

2. **Control industrial and transportation pollution.** Use advanced pollution control technology and management methods to reduce industrial and transportation pollution in the atmosphere.

3. **Strengthen monitoring and management.** Establish a comprehensive monitoring and management system to timely discover and solve atmospheric environmental problems.

4. **Promote public awareness and education.** Strengthen public awareness and education on environmental protection, and encourage people to take environmental actions.

5. **Promote low-carbon lifestyles.** Encourage people to adopt low-carbon lifestyles, such as walking, cycling, and taking public transportation, and reduce the use of motor vehicles to reduce emissions.

Strengthen international cooperation. Strengthen international cooperation to jointly address global climate change and atmospheric pollution issues, share technology and experience, and promote global ecological civilization construction.

7. **Adopt green buildings.** Promote green buildings and use energy-saving and environmentally friendly building materials and technologies to reduce energy consumption and pollutant emissions.

8. **Strengthen scientific research.** Strengthen atmospheric environmental science research, explore new governance methods and technologies, and provide scientific basis for atmospheric environmental governance.

9. **Develop clean energy.** Accelerate the development and utilization of clean energy, such as solar energy, wind energy, and hydropower, to reduce dependence on fossil fuels and thus reduce greenhouse gas emissions.

10. **Promote a circular economy model.** Promote a circular

economy model to maximize the use of resources and minimize the emission of waste, reducing damage to the natural environment.

11. Strengthen policies and regulations. Develop and improve relevant policies and regulations, strengthen the supervision and law enforcement of environmental protection departments, and effectively protect the health of the atmosphere.

Strengthen corporate social responsibility. Encourage companies to take social responsibility, actively adopt environmental protection measures, reduce pollution emissions, and contribute to improving atmospheric health.

13. Increase investment and technological innovation. Increase investment and technological innovation in the field of environmental protection, improve the level of environmental protection technology, and provide better support for atmospheric environmental governance.

14. Strengthen air pollution warning and emergency response. Establish a sound air pollution warning and emergency response mechanism, timely release warning information and take response measures to ensure public health.

15. Promote green transportation. Encourage people to use green transportation methods such as walking, cycling, and public transportation, reduce the use of motor vehicles, and thus reduce pollution emissions.

16. Increase carbon sequestration vegetation coverage. Increasing carbon sequestration vegetation coverage such as forests and grasslands can absorb a large amount of carbon dioxide and reduce greenhouse gas emissions.

17. Strengthen research on atmospheric governance technology. Strengthen research on atmospheric governance technology, promote advanced atmospheric governance technology, and improve governance efficiency and capacity.

18. Strengthen international cooperation and communication. Strengthen international cooperation and communication, share governance experience and technology, and jointly address global atmospheric environmental issues.

19. Advocate for low-carbon lifestyles. Advocate for low-carbon lifestyles such as water conservation and reducing food waste, reduce resource consumption and pollution emissions, and promote sustainable development.

20. Strengthen atmospheric environmental monitoring. Strengthen monitoring and evaluation of atmospheric environment, timely grasp the quality of atmospheric environment, and provide scientific basis for environmental governance.

In conclusion, improving atmospheric health requires comprehensive measures and efforts from multiple aspects. These include reducing greenhouse gas emissions, controlling industrial and transportation pollution, strengthening monitoring and management, promoting public awareness and education, promoting low-carbon lifestyles, strengthening international cooperation, adopting green buildings, strengthening scientific research, developing clean energy, promoting a circular economy model, strengthening policies and regulations, strengthening corporate social responsibility, increasing investment and technological innovation, strengthening air pollution warning and emergency response, promoting green transportation, increasing carbon sequestration vegetation coverage, and strengthening research on atmospheric governance technology. Through these measures, we can jointly protect the ecological environment of the earth, achieve harmonious

coexistence between humans and nature, and contribute to the health and sustainable development of people's lives and the world.

## 5.2. Future Research Directions

Future research directions include:

1. Atmospheric environment simulation and prediction. Using advanced numerical simulation techniques to improve the accuracy of atmospheric environmental prediction, providing scientific basis for environmental management and policy-making.

2. Analysis and control of atmospheric pollutant sources. Through analysis and analysis of pollutant sources, corresponding control strategies are formulated to reduce atmospheric pollutant emissions.

3. Research on atmospheric ecosystem and biodiversity. Strengthen research on atmospheric ecosystem and biodiversity, and deepen understanding of the impact of human activities on ecosystems and response mechanisms of ecosystems.

4. Atmospheric health management and risk assessment. Establish a comprehensive atmospheric health management and risk assessment system to timely discover and solve atmospheric environmental problems and protect public health.

5. Research on the mechanism of atmospheric pollutant transport and transformation. Study the mechanism of atmospheric pollutant transport and transformation in the air, explore effective methods and technologies for atmospheric pollution control.

6. Research on atmospheric environmental quality monitoring technology. Develop new atmospheric environmental quality monitoring technologies, improve the accuracy and timeliness of monitoring data, and provide better support for environmental management.

7. Research on atmospheric aerosols. In-depth study the sources, composition, variation patterns, and impacts of atmospheric aerosols on human health and the environment, providing scientific basis for atmospheric environmental governance.

8. Research on greenhouse gas emissions and reduction technologies in the atmosphere. Study the sources and emissions of greenhouse gases in the atmosphere, explore effective emission reduction technologies and measures, and promote global climate change response.

9. Assessment of atmospheric environmental policies. Evaluate and analyze different atmospheric environmental policies, providing scientific basis and reference for policy-making.

Study on the relationship between atmospheric health and climate change. In-depth study the relationship between atmospheric health and climate change, providing scientific basis for formulating policies and measures to address climate change.

11. Research on long-term trends in the atmospheric layer. Through research on the long-term trends in the atmospheric layer, predict possible environmental problems in the future, and provide scientific basis for formulating response measures.

12. Study on the interaction between human activities and ecosystems in the atmospheric layer. In-depth study the impact of human activities on the atmospheric ecosystem and the response mechanisms of the ecosystem to human activities, providing scientific basis for building a sustainable

development society.

13. Study on the health effects of atmospheric pollutants. Study the impact of atmospheric pollutants on human health and the mechanism of health effects, providing scientific basis for formulating health protection policies and measures.

14. Research on geochemical cycles in the atmospheric layer. Study the geochemical cycling process of elements and compounds in the atmospheric layer, explore their impact on the environment and ecosystem feedback mechanisms.

15. Research on water cycle in the atmospheric layer. Study the water cycle process in the atmospheric layer, explore its impact on climate change and the environment, and provide scientific basis for water resources management and protection.

16. Research on ecological restoration technology in the atmospheric layer. Study ecological restoration technology in the atmospheric layer, explore effective ecological restoration methods and technologies, and promote environmental protection and sustainable development.

17. Study on popular science education and public participation in the atmospheric layer. Strengthen popular science education and public participation in the atmospheric layer, improve public environmental awareness and participation, and promote environmental governance and sustainable development.

18. Research on international cooperation in the atmospheric layer. Strengthen international cooperation and communication, jointly address global atmospheric environmental issues, and promote global environmental governance and sustainable development.

In summary, more proactive measures are needed in the future to protect the health and stability of the atmospheric layer, while strengthening related research and deepening understanding of the impact of human activities on the atmospheric layer, providing scientific basis for environmental management and policy-making. Specifically, future research directions for atmospheric environment include atmospheric environment simulation and prediction, analysis and control of atmospheric pollutant sources, research on atmospheric ecosystem and biodiversity, atmospheric health management and risk assessment, research on the mechanism of atmospheric pollutant transport and transformation, research on atmospheric environmental quality monitoring technology, research on atmospheric aerosols, research on greenhouse gas emissions and reduction technologies in the atmospheric layer, assessment of atmospheric environmental policies, and study on the relationship between atmospheric health and climate change. In addition, it is also necessary to strengthen research on long-term trends in the atmospheric layer, interaction between human activities and ecosystems in the atmospheric layer, health effects of atmospheric pollutants, geochemical cycles in the atmospheric layer, water cycle in the atmospheric layer, ecological restoration technology in the atmospheric layer, popular science education and public participation in the atmospheric layer, and international cooperation in the atmospheric layer. Through in-depth exploration and practice of these research directions, we can better protect the earth's environment, achieve harmonious coexistence between humans and nature.

## 6. Conclusion

The atmospheric layer is one of the most important environments on Earth, with a crucial impact on the survival

and development of humans and other living beings. However, due to the impact of human activities, the atmospheric layer faces serious environmental problems, such as climate change and air pollution. These issues not only affect ecosystems and economic development but also directly threaten human health and survival.

To protect the health and stability of the atmospheric layer, we need to take comprehensive measures to reduce greenhouse gas and air pollutant emissions, strengthen monitoring and management, and promote public awareness and education. At the same time, we also need to strengthen related research, deepen understanding of the impact of human activities on the atmospheric layer, and provide scientific basis for environmental management and policy-making.

In the future, we need to take more proactive measures to protect the health and stability of the atmospheric layer, while strengthening related research and deepening understanding of the impact of human activities on the atmospheric layer, providing scientific basis for environmental management and policy-making. Only in this way can we ensure the health and stability of the atmospheric layer and create a better environment for humans and other living beings.

In addition to taking measures and strengthening research, it is also necessary to enhance international cooperation and jointly address global atmospheric environmental issues. Countries should strengthen information sharing, technology exchange and collaborative research, and promote global environmental governance and sustainable development.

Furthermore, atmospheric health is closely related to climate change, and atmospheric health issues should be included in the climate change agenda. It is important to strengthen international cooperation, develop effective policies and measures, and jointly address climate change and atmospheric health issues.

In the process of protecting the atmospheric layer, public participation and popular science education are also very important. The public should actively participate in environmental protection, improve environmental awareness and action ability. At the same time, it is important to strengthen popular science education on the atmospheric layer, increase public awareness and understanding of atmospheric environmental issues, and promote public participation in environmental governance and sustainable development.

In summary, protecting the health and stability of the atmospheric layer is one of the important challenges facing the world. Only by taking comprehensive measures, strengthening research and international cooperation, and enhancing public participation and popular science education, can we truly achieve the health and sustainable development of the atmospheric layer.

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