

## Impacts of Right To Food Concerning Climate Change Challenges: A Discussion

A. Sindhuja<sup>1</sup>, Dr. B. Venugopal<sup>2</sup>

<sup>1</sup>Research Scholar-School of Law, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Avadi, Chennai, Tamil Nadu,

<sup>2</sup>Dean, School of Law, Professor, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Avadi, Chennai, Tamil Nadu.

Email ID: [asindhuja27@gmail.com](mailto:asindhuja27@gmail.com).

### Abstract:

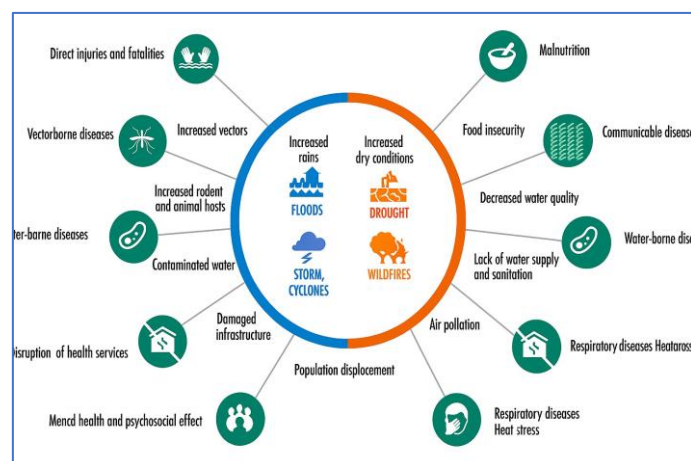
The Right to Food is a fundamental human right, yet the effects of climate change increasingly threaten it. This research examines the relationship between the Right to Food and the global climate crisis, highlighting how changing weather patterns impact food security, availability, affordability, and sustainability. It explores the risks farming systems face, the impact on marginalized communities, and the necessary policies to address these challenges. The study emphasizes the need for farming practices to adapt to climate change, equitable resource distribution, and global collaboration to safeguard the Right to Food. Using real-world examples and reviewing existing policies, it proposes new strategies and legal frameworks to create inclusive and sustainable food systems. The findings underscore the urgency of integrating climate resilience with the right to adequate nutrition to ensure a fair and lasting global food supply.

**Keywords:** Right-To-Food, Sustainable Development Goal, SDG-2, Food Security, Climate Change.

### Introduction

Environmental challenges, especially air pollution, affect the health of living beings, agricultural progress, and sustainable development in India. The rise in air pollutants such as Particulate Matter (PM<sub>2.5</sub> and PM<sub>10</sub>), Ozone (O<sub>3</sub>), Sulfur dioxide (SO<sub>2</sub>), and nitrogen oxides (NO<sub>x</sub>) results from increased vehicular emissions, industrialization, and urban growth. These pollutants not only harm living organisms but also reduce crop yields, degrade soil quality, and threaten long-term food security. Modern technology has advanced rapidly, including Deep Learning (DL) models, which are used to predict air pollution and protect health, livelihoods, and the environment.

The Constitution of India provides the framework for addressing environmental and food-related issues. In 1991, the Supreme Court of India, in *Subash Kumar v. State of Bihar*, issued a ruling under Article 21 that guarantees a “right to a wholesome environment” [5]. Additionally, Article 48A mandates that each state “endeavor to protect and improve the environment,” and Article 51(A) states that every citizen's duty is “to safeguard and improve the standard of the natural environment,” including lakes, rivers, forests, and wildlife. Article 21 also encompasses the Right to Food. Furthermore, the National Food Security Act, 2013, emphasizes providing food and nutritional security across the human life cycle by ensuring access to sufficient, quality food at affordable prices [4].



**Figure 1.** Impact of Climate Change on Food Security

In 1981, the key legislation, the Prevention and Control of Pollution Act, was enacted to address air quality, and this act stipulates that it “offers control, reduction, and prevention of air pollution” [1]. In 1981, the Government of India enacted the Environment Protection Act, which states that “the government can take any action if it is necessary or useful for protecting and improving the environmental quality” [2]. In 2010, the National Green Tribunal Act (Government of India) was passed, which assures “for the effective and immediate disposal of cases related to environmental protection, forests, and other matters related to natural resources” [3] [6].

The United Nations Sustainable Development Goals (SDGs) are aligned with these constitutional and regulatory acts. SDG 3, Good Health and Well-being, is supported by the air pollution prediction model to reduce illnesses and deaths caused by air pollution. SDG 13 focuses on climate change, addressing actions to handle climate variations, and SDG 2 aims for zero hunger, ensuring sustainable agriculture and food security [7]. The proposed prediction tools contribute to the right to food while also protecting the environment, such as reducing crop damage and safeguarding nutritional needs from air pollution. Therefore, India’s legal framework collaborates with hybrid DL models to address air pollutants, simultaneously satisfying government policies (ACT) and global commitments that align with SDGs 2, 3, and 13. To achieve a DL based air pollution detection model, this paper contributes the following:

- The relationship between the Right to Food and climate change is validated, showing that environmental disruptions can impact the availability and accessibility of food.
- This paper highlights that food security is vulnerable in a dynamic climate.
- The existing legal frameworks and policies are examined to identify the gaps and find solutions for equitable food distribution in the context of climate change.
- Climate change is analyzed to enhance the agricultural productivity, affordability, and sustainability of food systems.
- Sustainable resource management and climate-adaptive agricultural strategies are proposed for farming.
- This paper argues that governance and global collaboration should be combined to advance a climate-resilience approach in conjunction with the Right to Food.

- This paper also contributes to addressing food security challenges in relation to SDG 2, Zero Hunger.

### Literature survey

Grace et al. (2019) investigated how plant diseases can affect future climate conditions, and these climate changes have impacted plant productivity in both natural and agricultural environments. This research begins by examining the current and future impacts of climate change on the distribution of pathogens, agriculture, food security, disease occurrence and severity, and ecosystem health. Thus, the author introduces eco-evolutionary theories into existing systems to enhance risk assessments of pathogen spread and outbreaks. Climate change alters the structure of ecosystems by shifting optimal temperature ranges, leading to biodiversity loss. Not only does it exacerbate threats from food, water, and vector-borne diseases, but it also accelerates antimicrobial resistance due to prolonged pathogenic infections. Industries such as forestry and tourism are significantly impacted. Thus, Sahana et al. (2021) present this review, which introduces advanced global socio-economic and environmental approaches to climate change mitigation and adaptation and highlights their impact on the economy. To mitigate these hazardous outcomes, the world must make significant efforts to preserve the ecosystem, the economy, and human lives in the face of a changing climate.

Thomas et al. (2019) have analyzed various studies. Analysis of literature reveals that vulnerable populations are disproportionately affected by climate change, as their adaptive mechanisms are often overlooked by governments, despite international frameworks. These communities are often discriminated against and neglected by society's disaster management programs. The effects of climate change have severely impacted their livelihoods, which are already exacerbated by socioeconomic and political disparities. Existing adaptation and mitigation measures have not been very effective; thus, there is a great need for inclusive and equitable climate action. Roos et al. (2017) have presented an investigation for providing an alternative solution for agricultural practices that help achieve sustainability goals. Animal production, particularly meat and dairy, generates significant emissions and land use, but accounts for only 18% of food energy. On the other hand, perennial crops (especially of plant origin) cause very little environmental harm. Increasing the extent of perennial production, enabling low-impact production, encouraging climate-friendly diets, empowering women, and implementing biotechnological and digital solutions can revolutionize agro-food systems to achieve global food security and minimize environmental damage.

El Bilali et al. (2020) have stated that climate change contributes to food insecurity, encompassing issues related to production, food quantity, food quality, and equitable distribution, particularly in vulnerable areas. It has indirect effects on food access and consumption through its impacts on livelihoods, income, and people's health. To overcome these challenges, it is crucial to invest heavily in mitigation and adaptation to create climate-resilient, sustainable, and resilient food systems. This paper will explore the impacts of climate change on sustainable food production, including research gaps and biases. Implementation-oriented approaches should be prioritized to address existing food security issues.

Sorgho et al. (2020) have conducted an investigation into the impact of climate change on food and nutrition security (FNS), focusing on access and production, nutritional quality, and food price volatility. Research primarily focuses on mitigation and adaptation measures being implemented, particularly in Africa and Asia, where social inequality and poverty are prevalent. These climate change effects are disproportionately affecting vulnerable populations and highlight the importance of investing more in policies, research, and studies to address food security challenges. Sahya Maulu et al. (2021) have presented an inquiry into the effects of climate change on the production and sustainability of the aquaculture sector. The causes of warming, including increases in diseases, algae blooms, salinity, sea level rise, altered rainfall patterns, and extreme events, are also reviewed. Adaptation strategies and research gaps are identified. Although there are positive influences. The key to the survival of aquaculture is short-term adaptation and mitigation that depend on producers' regional adaptive capacity, ensuring the long-term productivity of the aquaculture sector worldwide.

### Limitation

This study has several limitations, although it provides an overview of the relationship between climate change and the Right to Food. It does not capture the real-time impact of climate change in specific regions because this research primarily relies on existing studies and secondary data. There is limited generalizability due to various socio-economic conditions, agricultural practices, and governance structures. While this paper does not provide a brief explanation of predictive analysis or quantitative modeling, it highlights reduction strategies and policy gaps related to future climate change and food security. The focus is mainly on human rights, but it lacks emphasis on technological development or economic feasibility for adapting to climate change. The motivation for the research is to address the impact of climate change on food security and human rights. Agricultural production is threatened by uneven climate patterns, such as heavy rainfall and rising temperatures, which increase insecurity related to hunger and malnutrition. SDG-2 is achieved through the Right to Food, but climate change delays progress toward attaining SDG-2.

### Proposed Methodology

This study employs a qualitative, exploratory design to investigate the intricate relationship between climate change and the Right to Food. Primarily focusing on secondary data analysis, the study interprets findings through a rights-based perspective within legal, environmental, and socio-economic contexts. By synthesizing evidence from both global and national sources, it adopts a systems-thinking approach to identify and propose sustainable, equitable mechanisms to fulfill the Right to Food in the context of climate change.

### Research Design

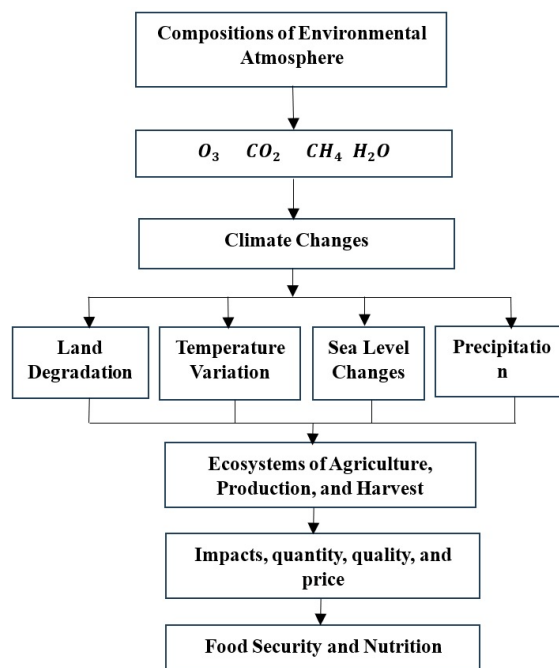
A descriptive-analytical research design was used for the study, incorporating case studies and a review of policy documents. This approach enabled a thorough understanding of the structural and environmental factors affecting food security amid climate change. The study aimed to identify patterns, vulnerabilities, and adaptive strategies by critically examining the literature and existing laws.

### Data Sources

Secondary data was collected from various reputable sources. These included peer-reviewed academic journals listed in Scopus and the UGC-CARE lists, policy briefs, white papers, and reports from international organizations such as the FAO, IPCC, WHO, UNDP, and WFP. Additionally, several national-level documents were reviewed, including the National Food Security Act (2013), reports on agricultural vulnerability, and publications from the Indian Meteorological Department.

### Case Study Selection

Case studies were intentionally selected based on their risk of experiencing food insecurity due to climate change. The selection criteria consisted of geographic vulnerabilities to climate events (e.g. droughts, floods, cyclones), socio-economic vulnerabilities, and active food security interventions in place. In total, three cases were selected: the Bundelkhand Region, India – droughts and crop yield decline; the Sahel Region, Sub-Saharan Africa – desertification and conflict-induced displacement; and the Coastal Region of Bangladesh – cyclonic activity, salinization, and disruption of agriculture. These three case studies were selected to explore the different climatic contexts and the policies sought to address food insecurity challenges.



**Figure 2.** Overall Workflow

Figure 2 represents the proposed methodology. Initially, in the atmosphere, greenhouse gases such as O<sub>3</sub>, CO<sub>2</sub>, CH<sub>4</sub>, and H<sub>2</sub>O are increased due to human activities and natural processes. The greenhouse effect is exacerbated by these gases, leading to climate change, including rising temperatures, rising sea levels, altered rainfall patterns, and land degradation. These climate changes also affect agricultural environments, such as reduced production and fewer harvests, making the agricultural management system ineffective. This can lead to higher prices for agricultural products, but if the products are of poor quality, it also affects the food supply chain at both local and global levels. The impact of food security and nutrition is increased when the availability and scalability of sufficient, healthy food are reduced, leading to increased

malnutrition and hunger. Therefore, this proposed workflow highlights the impacts of atmospheric changes, which also change the nutritional and global security.

### Analytical Framework

The study employed a rights-based approach to food security, investigating multiple dimensions. The study examined food availability by assessing the impacts of climate change on agricultural production. The study also examined accessibility in terms of both economic and physical access to food. Utilization was another consideration, referring to the nutritional quality and safety of the food. The study also incorporated stability, which relates to the resilience and consistency of food systems, as well as the legal and policy context, reviewing the strength and adaptability of Right to Food laws. Each case study was evaluated for how climate change affected these dimensions, as well as for existing mitigation or adaptation policies.

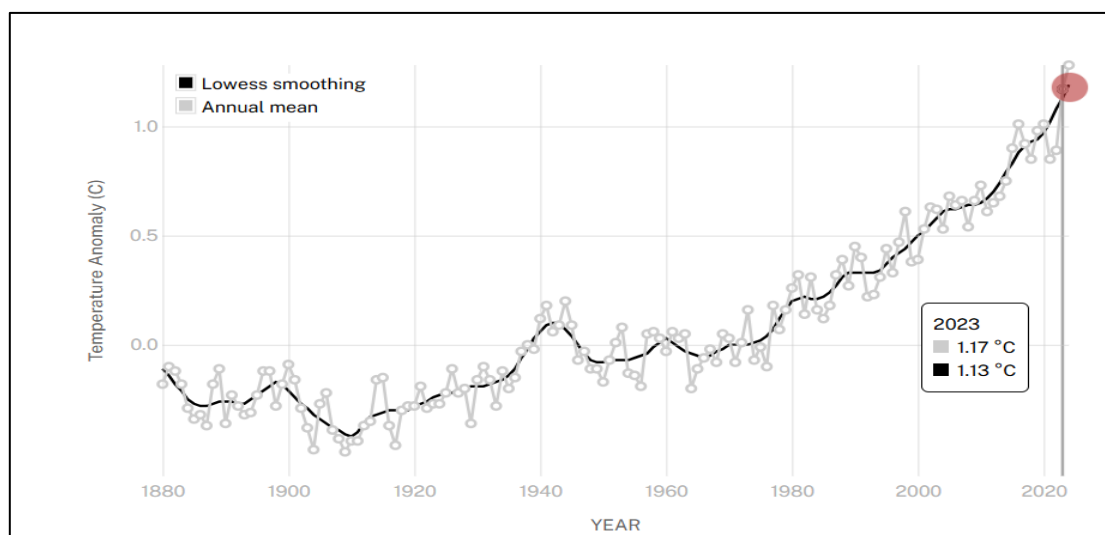
### Results and Discussion

The report demonstrates that climate change is exacerbating vulnerabilities in food systems, particularly in rural and marginalized populations. The global analysis report generated by NASA shows that, over the period from 2015 to 2024, climate change has affected various natural systems, including temperature, water levels, food production, and carbon dioxide emissions. Table-1 depicts the climate change analysis results over the period of 2015 to 2025.

**Table-1: Global Impacts of Climate Change**

| Factors                                | Years     |           |           |           |           |
|----------------------------------------|-----------|-----------|-----------|-----------|-----------|
|                                        | 2015-2016 | 2017-2018 | 2019-2020 | 2021-2022 | 2023-2024 |
| Global Temperature Anomaly             | ~0.97     | ~0.91     | ~1.00     | ~1.00     | ~1.24     |
| CO <sub>2</sub> (ppm)                  | ~402      | ~407      | ~412      | ~417      | ~422      |
| Fossil CO <sub>2</sub> Emission /yr    | ~35.4     | ~36.3     | ~36.5     | ~36.6     | ~98       |
| Sea Level Rise                         | ~67       | ~75       | ~82       | ~90       | ~98       |
| Ocean Heat                             | ~224      | ~236      | ~247      | ~259      | ~276      |
| Surface Ocean pH                       | 8.08      | 8.06      | 8.05      | 8.04      | 8.02      |
| Arctic sea Ice million km <sup>2</sup> | ~4.3      | ~4.6      | ~4.1      | ~4.6      | ~4.1      |
| Glacier Mass Balance                   | ~0.95     | ~0.75     | ~0.85     | ~0.90     | ~1.05     |
| Carbon Sink /year                      | -12       | -11.5     | -11       | -10       | -9        |

Global climate trend indicators from 2015 to 2024, as shown in table-1 indicate that the global climate range has continued to change. The global temperature anomaly increased from 0.97°C to 1.24°C above the pre-industrial level, and the atmospheric CO<sub>2</sub> concentration rose from 402 ppm to 422 ppm. Fossil CO<sub>2</sub> emissions rose slightly from around 35.4 to 37.3 GtCO<sub>2</sub>/year during the time frame that is covered. Global mean sea level continued to rise in the reference period, and was about 31 mm higher relative to the 1993 average value (range from about 67 to 98 mm above this level range), and ocean heat content continued to increase from about 224 EJ/yr in the early part of the decade (calculated using an earlier generation of models) up to about 276 × 10<sup>22</sup> joules/year.



**Figure-3** Climate changes over the years [16]

The graph displays the global temperature anomaly from 1880 to 2023, illustrating Earth's average surface temperature compared to a historical baseline. The early years show relatively steady or slightly cooler temperatures, but starting in the late 20th century—especially after 1970—there is a clear, sharp increase in the warmest points, with a corresponding rise in global temperature. The annual variation is indicated by the gray line, while the long-term warming trend is depicted in black using Lowess smoothing. With a smoothed trend of  $+1.13^{\circ}\text{C}$ , 2023 was the warmest year on record, experiencing one of its highest temperature anomalies at  $1.17^{\circ}\text{C}$ , largely attributed to global warming. This sharp rise illustrates how greenhouse gas emissions, primarily resulting from human activities such as burning fossil fuels, have increased over time. The warming threatens ecosystems, agriculture, water supplies, and human health, and the report urges Boy to do more to prevent a  $1.5^{\circ}\text{C}$  rise in average global temperatures under the Paris climate agreement.

**Table-2: Impact Of Climate Change On The Right To Food**

| Region              | Climate Impact                | Food security challenge           | Measures                          | Limitations                                                     |
|---------------------|-------------------------------|-----------------------------------|-----------------------------------|-----------------------------------------------------------------|
| Bundelkhand (India) | Drought Recurring             | Crop failure, unreliable PDS      | Community PDS                     | Delayed benefits, poor irrigator                                |
| Sahel (Africa)      | Desertification, extreme heat | Loss of arable land, displacement | Food aid Programs, pastoralist    | Logistics, limited adaptation of crops.                         |
| Coastal Bangladesh  | Cyclone, saline intrusion     | Rice crop damage, low yield       | Floating farming, saline-tolerant | Weak policy integration and funding issues in crop cultivation. |

The analysis report (table-2) shows that climate change worsens vulnerabilities in food systems, especially in rural and marginalized populations. In India's Bundelkhand region, unpredictable rainfall, combined with prolonged dry periods, has led to multiple crop failures and increased reliance on the Public Distribution System (PDS). Unfortunately, the PDS can be unreliable, as food deliveries sometimes fail or take too long. Another impact of climate

change on food systems in this area underscores the need for stronger, locally controlled food storage and distribution networks. In the Sahel region, rising global temperatures and desertification have significantly reduced arable land, leading to higher hunger rates and forced migration. The failure of rainfed development emphasizes the importance of adopting climate-resilient crops and improving irrigation infrastructure. Additionally, regional food assistance often fails to reach displaced populations, such as involuntary migrants, due to logistical and bureaucratic challenges. In Bangladesh's coastal regions, the frequency of cyclones and saline intrusion is increasing, which affects food security, especially rice, the staple food. Communities affected by climate change are adapting by implementing dual-cropping systems, including floating agriculture and saline-tolerant seed varieties. While these innovations show promise at the local level, they lack formal support and would be difficult to integrate into larger-scale national food policy reforms.

## Conclusion

The Right to Food is increasingly under threat due to major challenges posed by climate change. Changes in weather patterns, soil degradation, and water shortages threaten food production, while rising food costs add to the inequality and vulnerability of marginalized groups. This paper argues that achieving food security in the face of climate change depends on adopting adaptive agricultural practices, expanding legal protections, implementing equitable policies, and fostering international cooperation. When sustainability and climate resilience are embedded in our food systems, we can protect populations' nutritional needs and uphold human dignity. Research highlights the urgent need to develop inclusive strategies that address the needs of vulnerable populations and address systemic issues of inequality and limited access to resources. Ultimately, ensuring the Right to Food in the face of climate change is a global moral duty and offers a chance to advance the goal of worldwide sustainable development.

Future studies should focus on data collection and predictive modeling for specific regions to assess the localized impacts of climate change on food systems. Additionally, leveraging technological innovations such as AI forecasting, climate-smart agriculture, and ground- and satellite-based data collection could enhance the resilience of food systems and increase transparency in scientific research. Interdisciplinary research involving law, environmental science, and economics is also essential to develop effective approaches moving forward. Collaboration among communities, researchers, and policymakers will be crucial to developing sustainable strategies that uphold the Right to Food in the face of a changing climate.

## References

1. Government of India. (1981). The Air (Prevention and Control of Pollution) Act, 1981. New Delhi: Ministry of Law and Justice.
2. Government of India. (1986). The Environment (Protection) Act, 1986. New Delhi: Ministry of Law and Justice.
3. Government of India. (2010). The National Green Tribunal Act, 2010. New Delhi: Ministry of Law and Justice.
4. Government of India. (2013). The National Food Security Act, 2013. New Delhi: Ministry of Law and Justice.

5. Supreme Court of India. (1991). Subhash Kumar v. State of Bihar and Ors., AIR 1991 SC 420.
6. Constitution of India. (1950). Government of India.
7. United Nations. (2015). Transforming Our World: The 2030 Agenda for Sustainable Development.
8. Grace, M. A., Achick, T. E., Bonghan, B. E., Bih, M. E., Ngo, N. V., Ajeck, M. J., ... & Ntungwen, F. C. (2019). An overview of the impact of climate change on pathogens, pest of crops on sustainable food biosecurity. *Int. J. Ecotoxicol. Ecobiol*, 4, 114-119.
9. Sahana, M., Rehman, S., Paul, A. K., & Sajjad, H. (2021). Assessing socio-economic vulnerability to climate change-induced disasters: evidence from Sundarban Biosphere Reserve, India. *Geology, Ecology, and Landscapes*, 5(1), 40-52.
10. Thomas, K., Hardy, R. D., Lazrus, H., Mendez, M., Orlove, B., Rivera-Collazo, I., ... & Winthrop, R. (2019). Explaining differential vulnerability to climate change: A social science review. *Wiley interdisciplinary reviews: Climate change*, 10(2), e565.
11. Röös, E., Bajželj, B., Smith, P., Patel, M., Little, D., & Garnett, T. (2017). Greedy or needy? Land use and climate impacts of food in 2050 under different livestock futures. *Global Environmental Change*, 47, 1-12.
12. El Bilali, H., Bassole, I. H. N., Dambo, L., & Berjan, S. (2020). Climate change and food security. *Agriculture & Forestry/Poljoprivreda i šumarstv*, 66(3).
13. Sorgho, R., Quiñonez, C. A. M., Louis, V. R., Winkler, V., Dambach, P., Sauerborn, R., & Horstick, O. (2020). Climate change policies in 16 West African countries: A systematic review of adaptation with a focus on agriculture, food security, and nutrition. *International journal of environmental research and public health*, 17(23), 8897.
14. Maulu, S., Hasimuna, O. J., Haambiya, L. H., Monde, C., Musuka, C. G., Makorwa, T. H., ... & Nsekanabo, J. D. (2021). Climate change effects on aquaculture production: sustainability implications, mitigation, and adaptations. *Frontiers in Sustainable Food Systems*, 5, 609097.
15. <https://climate.nasa.gov/vital-signs/global-temperature/?intent=111>.