Houston Area Model United Nations
Standard Committee

Group of Twenty



Chair | Phillip Tian
Topic A: Food Supply Chain Resilience Amid Climate Change
Houston Area Model United Nations 52
February 4 & 5, 2027

Atilgan Ozdil/Anadolu Ag

Letter From the Chair

Hello delegates,

My name is Phillip Tian and I'm a Junior Biochemistry/Biophysics major at the Honors College here at UH!

Last year, determined not to become the stereotypical lab-dwelling pre-med zombie, I went searching for non-medicine activities and stumbled into the world of Model Debate. With some persuasion from my dear friend (and fellow WHO Chair) Aiza, I ended up trying out for the traveling team here at UH! (*I was forced*). Through Model Debate, I've been able to go to places like Philadelphia, New York City, and Washington D.C. It's been an incredible experience so far. Last HAMUN, I had the pleasure of being the Vice Chair for IMO.

I'm thrilled to keep the ball rolling by serving as your G20 chair this year. The Group of Twenty (now 21) is the premier international forum for coordinating economic policy amongst developed and emerging economies. Given the current political landscape, economic policy is no longer just ambient noise. What happens in rooms like the G20 doesn't just stay there; It's embedded in our grocery bills, our job markets, our futures, and decisions made follow each and every one of us home.

Ultimately, I know not everyone is in love with economics (I'm literally trying to become a doctor). However, I also know real growth happens when things get hard, and I have no doubt every one of you is ready for this challenge. Fair warning: this committee will be very research heavy. There's lots of jargon used in this space, and countries will hold sharply opposing stances on almost every issue, largely due to economic status.

A couple pieces of advice for this conference: preparation is your best friend! Knowing your stance and having a plan will help tremendously in easing your nerves. Think about potential problems that could arise during debate and get comfortable engaging with topics that challenge you. Last, and in my opinion the most important part: have fun! This is a time to step out of your comfort zone and meet new people; Enjoy it! Please don't hesitate to reach out if you have any questions.



I wish you all the best of luck, and I can't wait to see you next spring!

Phillip Tian
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Committee Background

No Time to Waste

The G20 operates a little differently than many probably expect. Some say it's the most powerful economic body on earth, yet it technically has no power at all. It doesn't have a charter, HQ, or staff to reach. It actually isn't even an official body. It was created in 1999 because the Asian Financial Crisis proved the G7 was too small a room and the UN too big to get anything done. The solution was nineteen countries + the EU coming together, which we now call a summit.

Since then, the G20 has been the closest thing the world has to an economic emergency room. However, one problem remains: the G20 is held together largely by promise and obligation.

With no legal authority, the G20 relies on reputational pressure and the simple fact that its members collectively make up approximately 85% of the global GDP.

Spontaneous Evolution

Somewhere along the way, the G20 stopped being just about money and started covering everything money touches.

Delegates must keep multiple things in mind simultaneously: their country's economic self-interest, the reality that problems like food supply chains and financial governance don't care about borders, and the political limits of what their government could and would realistically agree to back home. A resolution that only protects one delegation's GDP will be cut on arrival. Another that overlooks economic sovereignty will also be blocked.

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Topic Relevance

The Right to Eat

In 1948, the UN officially declared the right to food is part of the right to an adequate standard of living in Article 25 of the Universal Declaration of Human Rights. However, honoring that right depends entirely on a system built on contradiction. At scale, our global food system runs on a veridical paradox: farms are more productive than ever, yet grow more fragile as time passes. A single American farm in the 1930s was estimated to produce enough food on average to feed 4 adults annually. By the 60s, that number rose to around 25 adults annually. Today, this figure sits at an all time high, with one U.S farm able to sustain an average of 183 adults for an entire calendar year. In order to achieve this extreme efficiency, all "redundancy" has been eliminated from the system. Since the entire global food chain now relies on a few specialized crops, massive centralized processing plants, and just-in-time (JIT) logistics, it's left precariously brittle and vulnerable to a single point of failure.

A Score of Warnings

This fragility unfortunately did not stay an abstract. Over the last 2 decades, continuous economic, environmental, and political shocks have tested the limits of this ultra efficient system. The 2007-2008 World Food Price Crisis was the first major warning. Simultaneous fuel cost increases, biofuel mandates, extreme weather events, and export restrictions caused staple crop prices to explode, triggering mass social unrest in dozens of countries across the globe (Turkiye, Honduras, etc.).

Just a decade later, COVID-19 took the world by storm: closing ports, emptying shelves, and exposing how dependent entire regions were on food produced thousands of miles away. Then came the Russia-Ukraine and Iran wars, taking multiple top grain and fertilizer exporters out of global markets almost overnight. While each crisis was uniquely different, each uncovered the same harsh truth: a system made for maximum efficiency has left nothing to absorb shock.

The Human Cost

The consequences of these weak points are not limited to economic decline; they're also measured in human health. Malnutrition imposes enormous direct and indirect costs on individuals, families, and nations as a whole.

The World Bank estimates that calorie and micronutrient deficiencies alone cost over $3.5 trillion a year. As children growing up in these conditions come into adulthood, these costs compound: adult earnings fall by approximately 2.4% for every 1% loss in potential adult height caused by childhood stunting, poor school performance, and reduced labor productivity. In 2024, more than 150 million children under five were deemed “stunted”, a condition linked with permanent cognitive losses and reduced lifetime earnings, with the burden falling disproportionately on the Global South. The World Bank also explicitly notes that food price hikes and climate shocks are actively negating progress made in stunting prevention over the past three decades.

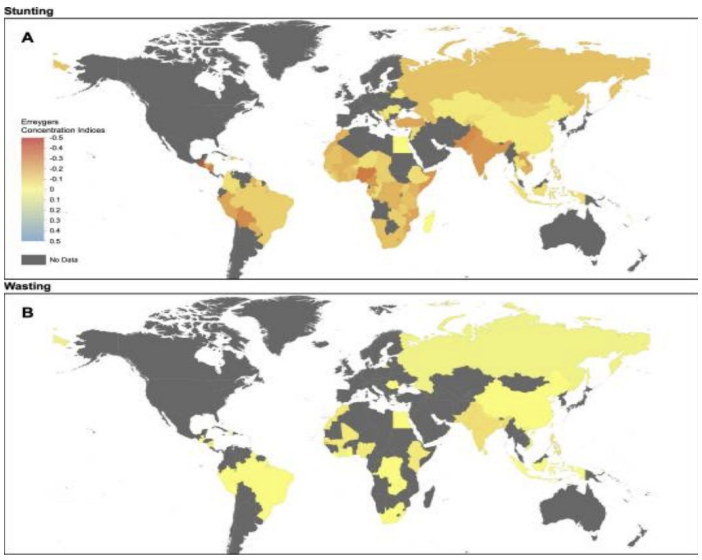


Fig 1. Map of most recent concentration indices for prevalence of stunting and wasting

The Catastrophic Loop

In other words, food supply chain fragility and public health are locked in a negative feedback loop: climate shocks and supply disruptions drive malnutrition, and malnutrition, in turn, drains the economic capacity nations need to build more resilient food systems in the first place. This is precisely the kind of interconnected, high-stakes problem the G20 was created to address, and it's why the body has returned to food security repeatedly since its founding. Following the 2007-08 crisis, the G20 adopted its 2011 Action Plan on Food Price Volatility and Agriculture, aimed at improving market transparency and coordinating responses to price shocks. That commitment was later folded into the broader G20 Action Plan on Food Security and Sustainable Food Systems, in which member states recognized that improving food security and nutrition amid intensifying pressure on natural resources and climate impacts would require raising agricultural productivity while simultaneously building more resilient food systems.

Despite these commitments, implementation has consistently lagged behind the scale of the problem, and climate-driven disruptions, along with their mounting health and economic toll, have continued to accelerate faster than the G20's policy response.

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Current Issues & Challenges

Stretched to the Max

While the exact amount of connections between businesses is difficult to pinpoint due to volatility and decentralization, estimates place the scale at over 300 million firms, connected by over 12 billion relationships. These interconnections support roughly 63% of the global GDP, but as seen myriads of times before, a disruption in one node can cascade through multiple others before a response can be made. This is where climate change comes in: global temperatures are projected to rise by 2.9°C by 2050, bringing more extreme weather events and placing more strain on our outdated agricultural systems.

Turning Up the Heat

A 2025 study analyzing over a decade of panel data from 30 Chinese provinces found 3 major findings:

1. the impact of temperature on food supply chain resilience is significantly higher than the impact of rainfall;
2. climate change affects food supply chains differently depending on the region and how much machinery/technology is used in food production;
3. increasing crop diversification shows massive potential in mitigating negative effects of temperature fluctuations.

In practice, this means warming itself, not the secondary effects of drought or flooding, is the main factor undermining the systems that move food from field to table. This effect varies significantly between major food-producing regions and non-major ones, and across different levels of farm mechanization, meaning resilience plays out unevenly within countries too.

Feeding More People With Less Corn

Meanwhile, global food supply will need to increase by 60% to feed a growing population projected to reach 9.7 billion by 2050. That target continues to move further out of reach; yields of major staple crops such as corn, wheat, and rice have already declined 4-13% in key growing regions. Climate models suggest further losses are expected as warming continues and extreme weather events increase in frequency. Top agricultural exporters such as the US, Brazil, and the Netherlands hold the most leverage, as they have to weigh cooperating in global food security efforts against preserving their own market share. Import-dependent states, especially in climate-vulnerable regions such as Sub-Saharan Africa, and South Asia face the sharpest exposure to shortages and price shocks, with little leverage to influence the terms.

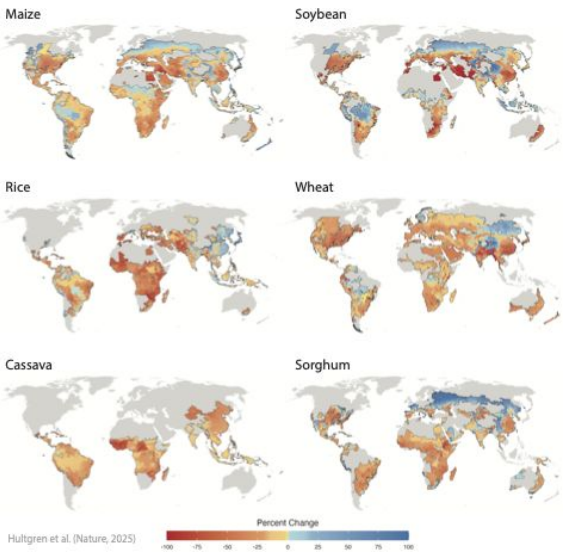


Fig 2. Projected end of century staple crop yield reductions. Credit: Josie Garthwaite, Stanford. Adapted from *Hultgren et al. (Nature, 2025)*

Breadbasket, Meet Heatwave

Interestingly, this is not a primarily rich versus poor divide like many other economic issues. A 2025 dataset from the UNDP's Human Development Report Office (in collaboration with the Climate Impact Lab), found that every additional degree Celsius of warming will reduce the world's food production capacity by 120 calories per person per day. As Stanford's Solomon Hsiang put it, a 3 degree increase is "basically like everyone on the planet giving up breakfast". While the world's poorest countries still face the steepest relative losses, breadbasket economies are not insulated either. Researchers from Rutgers University project that by 2100, the wealthiest agricultural regions could see yield reductions averaging 41%, compared to 28% in the lowest income regions.

The U.S Corn Belt, some of the most productive farmland on earth, is projected to be hit disproportionately hard, with warnings that the region may no longer be able to support corn cultivation. As a whole, climate change systematically disrupts every level of the food supply chain.



Fig 3. Cattle rancher Brad Randel walks through his drought-stricken cornfield on September 12, 2022 in McCook, Nebraska. *Ricky Carioti/The Washington Post/Getty Images*

Science Backed Proposed Solutions

The Limit Does, in Fact, Exist

Researchers and policy analysts have converged on several concrete directions for building resilience, many of which are directly actionable for this committee.

Adaptation alone will not be enough, but it does meaningfully soften the blow. The Climate Impact Lab's research found that when farmers adjust practices, switching crop varieties, shifting planting and harvesting dates, or altering fertilizer use, these adaptations can offset roughly one-third of climate-related yield losses by 2100. The remaining two thirds will persist regardless, meaning more active countermeasures need to be taken to close the gap.

Raining Cats and Dogs

Access to accurate, localized weather forecasting is one of the simplest and most effective tools available. The University of Chicago's Human-Centered Weather Forecasts Initiative uses AI-driven forecasting to give farmers advance notices of coming weather. In 2025, they partnered with the Indian government to deliver advanced rainy season forecasts to 38 million farmers. Researchers note that once rain begins, it's usually too late to make impactful decisions such as switching crops or re-allocating labor. Consequently, just a month's advance notice can be the difference between successful adaptation or taking a full loss.

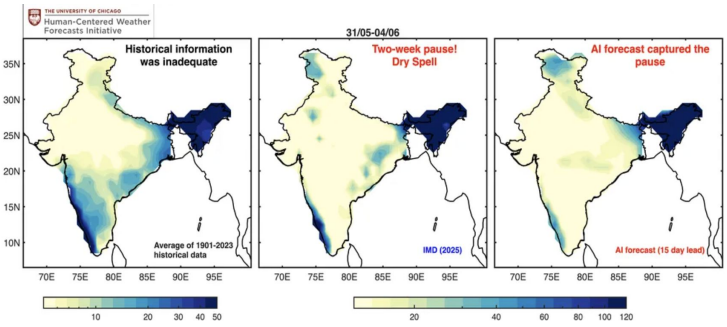


Fig 4. Left: Average historical meteorological data across 120 years. Middle: India records 2 week dry spell during monsoon season. Right: AI predicted this pause 2 weeks in advance. Credit: The University of Chicago Institute for Climate and Growth's Human-Centered Weather Forecasts Initiative.

Maps Manage Risk

Data infrastructure at the international level is equally important. A 2024 policy brief from the Complexity Science Hub Vienna (CSH) identified food security as a sector "most vulnerable to climate-driven disruption", specifically calling out the G20 for its unique position in leading global efforts in this space.

The CSH argues that the non-negotiable solution is a comprehensive, granular supply data network, with aims at quantifying supply chain risk. Under this solution, countries are advised to reconstruct maps of their own domestic supplier-buyer relationships using tools like tax records, payment flow data, or commercial data suppliers. Several countries including Brazil, Spain, Japan, Mexico, and India already hold a similar dataset, but have yet to maximize its utility.

Don't Put All Your Eggs (or Bread) in One Basket

On the production side, temperature was identified as the primary threat to food supply chains and crop diversification, providing meaningful mitigation against the negative effects of temperature fluctuations. Industry researchers echo this sentiment but suggest a multi-prong approach. A 2025 report from BCG and the World Economic Forum recommends investments in the following areas: sustainable/regenerative farming practices, climate-resilient seed varieties, and AI-driven precision agriculture models that allow farmers to respond to volatile conditions in real time. Diversification of sourcing strategies with improved storage and logistics infrastructure are also recommended.

Four Pillars of Resilience

All in all, scientists broadly converge on a resilience strategy built on four pillars: forecasting data, diversification (crop, region, route), adaptive technology investment, and international cooperation regarding data and resource sharing. **The key is providing targeted interventions for each country/region to adapt on their own.**

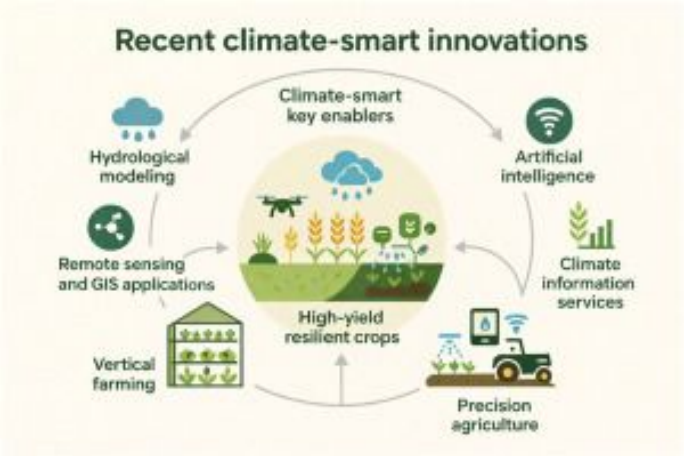


Fig 5. Recent Attempts at Comprehensive Innovations, with a focus on technological integration and genetic modification. Credit: Muhammad Awais, Xiuquan Wang, Muhammad Umair Ashraf, Mitigation and adaptation strategies in climate-smart agriculture: A review for sustainable production.

Past G20 Action

From Fixing Prices to Fixing Everything

The G20 has addressed food security and agricultural resilience through several initiatives over the past decade. While earlier efforts primarily focused on food-price volatility and market stability, the G20 has increasingly recognized the importance of building resilient food systems capable of withstanding environmental and economic disruptions. Some examples of previous actions:

1. **Paris Agriculture Ministers' Meeting (2011):** Adopted the G20 Action Plan on Food Price Volatility and Agriculture; created the Agricultural Market Information System (AMIS) and an Excessive Food Price Variability Early Warning System.
2. **Development Working Group (2011):** Launched the Global Agriculture and Food Security Program (GAFSP), an early funding mechanism for agricultural development in low-income countries.
3. **Brisbane Summit (2014):** Announced the G20 Food Security and Nutrition Framework, shifting focus toward malnutrition and long-term food system sustainability.
4. **Antalya Summit (2015):** Released the G20 Action Plan on Food Security and Sustainable Food Systems, the first explicit link between food security and climate/natural resource pressure.
5. **Hangzhou Summit (2016):** Reaffirmed existing food security commitments, with limited new action.
6. **Hamburg Summit (2017):** Committed to improving food security and water security, broadening the agenda to the water-food nexus.
7. **Rome Summit (2021):** Endorsed the Matera Declaration on Food Security, Nutrition and Food Systems, the G20's most recent major commitment, calling for accelerated investment in sustainable food systems.

Questions to Consider

1. How can the G20 balance the interests of major agricultural exporters with the needs of import dependent, climate vulnerable nations? (Especially given that even breadbasket economies face steep long-term yield losses of their own?)

2. What role should data sharing and national supply chain mapping play in early warning systems? How can countries with underutilized datasets, like Brazil, India, or Mexico, be incentivized to put them to use?

3. How can crop diversification, climate resilient agriculture, and AI driven forecasting be brought to scale in regions that lack the technological or financial resources to invest in them independently?

4. Should wealthier G20 nations take on greater responsibility for the environmental and labor costs embedded in their food imports from non-G20 countries?

5. Given that adaptation alone can only offset roughly one-third of projected climate losses, what should the G20 prioritize investing in to close the remaining gap? What mechanisms can ensure new G20 commitments don't end up like past attempts, where ambitious language failed to translate into meaningful implementation?

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TOPIC A APPENDIX & SOURCES

Alao, Rotimi, et al. "Economic Inequality in Malnutrition: A Global Systematic Review and Meta-Analysis." *BMJ Global Health*, vol. 6, no. 12, Dec. 2021, p. e006906, https://doi.org/10.1136/bmjgh-2021-006906.

Benton, Tim G., and Rob Bailey. "The Paradox of Productivity: Agricultural Productivity Promotes Food System Inefficiency." *Global Sustainability*, vol. 2, 2019, https://doi.org/10.1017/sus.2019.3.

"Climate Change Cuts Global Crop Yields, Even When Farmers Adapt." *Stanford Doerr School of Sustainability*, Stanford University, 2025, sustainability.stanford.edu/news/climate-change-cuts-global-crop-yields-even-when-farmers-adapt/.

"Cost of Malnutrition." *Global Panel*, 12 June 2019, www.glopan.org/cost-of-malnutrition/.

"FARM 250." *American Farm Bureau Federation*, 2026, www.fb.org/initiative/farm250.

"Forecasting the Onset of the Indian Monsoon." *HCWF*, 30 Jan. 2026, humancenteredforecasts.climate.uchicago.edu/forecasting-the-onset-of-the-indian-monsoon/.

TOPIC A APPENDIX & SOURCES

Hassanzadeh, Pedram. "Human-Centered Weather Forecasts (HCWF) Initiative." *HCWF*, 17 Apr. 2025, humancenteredforecasts.climate.uchicago.edu/.

Jin, Shengtian, et al. "Effect of Climate Change on Food Industry Supply Chain Resilience in China on the Basis of Double Machine Learning Models." *Foods*, vol. 14, no. 21, Oct. 2025, p. 3623, https://doi.org/10.3390/foods14213623.

Muhammad, Awais, et al. "Mitigation and Adaptation Strategies in Climate-Smart Agriculture: A Review for Sustainable Production." *Climate Smart Agriculture*, vol. 3, no. 1, Feb. 2026, p. 100097, https://doi.org/10.1016/j.csag.2026.100097.

"New Climate Dataset Warns Both Rich and Poorest Nations Will See Sharp Drop in Crop Yields." *The Institute for Climate and Sustainable Growth*, 5 Nov. 2025, climate.uchicago.edu/news/new-climate-dataset-warns-both-rich-and-poorest-nations-will-see-sharp-drop-in-crop-yields/.

"Nutrition." *World Bank Group*, 2024, www.worldbank.org/ext/en/topic/health/nutrition.

Pinkstone, Joe. "Climate Change Impact on Food 'Like Everyone Giving Up Breakfast.'" *The Institute for Climate and Sustainable Growth*, 18 June 2025, climate.uchicago.edu/news/climate-change-impact-on-food-like-everyone-giving-up-breakfast/.

TOPIC A APPENDIX & SOURCES

"Researchers Find Climate Change Threatens Global Food Supply." *Rutgers University*, 2025, www.rutgers.edu/news/researchers-find-climate-change-threatens-global-food-supply.

"Rising Heat and Dry Air Cut Global Crop Yields." *Stanford University*, 2025, news.stanford.edu/stories/2025/05/global-crop-yields-climate-change-research.

"Scientists Call for G20 Action on Supply Chain Data." *Complexity Science Hub*, 12 Nov. 2024, csh.ac.at/news/scientists-call-for-g20-action-on-supply-chain-data/.

"Scientists Call for G20 Action on Supply Chain Data." *EurekAlert!*, 12 Nov. 2024, www.eurekalert.org/news-releases/1064507.

Sustainably Feeding the World in 2050: Will There Be Enough Food? EIT Food, 2019, www.eitfood.eu/deep-dives/sustainably-feeding-the-world-in-2050-are-efficiency-and-equity-the-answer.

UNDP Human Climate Horizons. United Nations Development Programme, horizons.hdr.undp.org/.

Unnikrishnan, Shalini, et al. "Building Resilience in Agrifood Supply Chains." *BCG Global*, May 2025, www.bcg.com/publications/2025/building-resilience-in-agrifood-supply-chains.

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