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Unit

# 3

# Feeding the growing world

## Learning objectives

**After studying this unit, you will be able to:**

- explain the value of 3D ocean farming and the revival of forgotten crops in addressing global food challenges;
- introduce China's contributions to sustainable agricultural practices, focusing on the development and implementation of perennial rice;
- compose a well-structured problem-solution essay on food security;
- give an informed and persuasive speech on China's innovative approaches to advancing global food security.







## Unlocking the topic

### Setting the scene

Food security encompasses the availability, accessibility, and utilization of food resources to ensure that all individuals have consistent access to sufficient, safe, and nutritious food to maintain a healthy life. In the face of escalating challenges, such as population growth, climate change, and natural resource scarcity, experts worldwide are intensifying efforts to develop innovative and sustainable solutions. Against this backdrop, your university is organizing a youth forum on food security, convening students from overseas universities to foster dialog, exchange perspectives, and collaborate on feasible strategies. As a representative of your university, you are invited to deliver a three-minute speech during the forum's opening ceremony, focusing on China's pioneering initiatives in enhancing global food security.



### Activating subject knowledge



Scan the code and complete the knowledge activation exercise on Ucampus.

# Viewing through the lens

## Word bank

**seaweed** /'si:wi:d/ *n.* 海藻

**mussel** /'mʌsl/ *n.* 贻贝

**scallop** /'skɒləp/ *n.* 扇贝

**crate** /kreɪt/ *n.* 板条箱

**clam** /klæm/ *n.* 蛤蜊

**pesticide** /'pestɪsɪd/ *n.* 杀虫剂

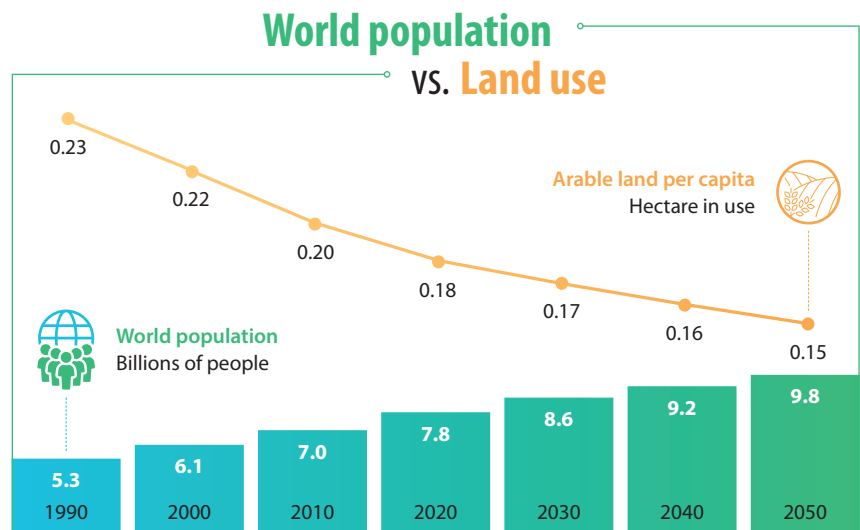
**antibiotic** /,æntɪbaɪ'ɒtɪk/ *n.* 抗生素

**regenerative** /rɪ'dʒen(ə)rətɪv/ *a.* 再生的

**nitrogen** /'naɪtrədʒ(ə)n/ *n.* 氮

## Pre-viewing

Work in groups and examine the graph in detail. Identify the core challenges of food security illustrated by the graph.



## Viewing and synthesizing



What do you think about using the ocean for future food and fuel? Scan the code. Watch the video clip and complete the notes with what you hear.

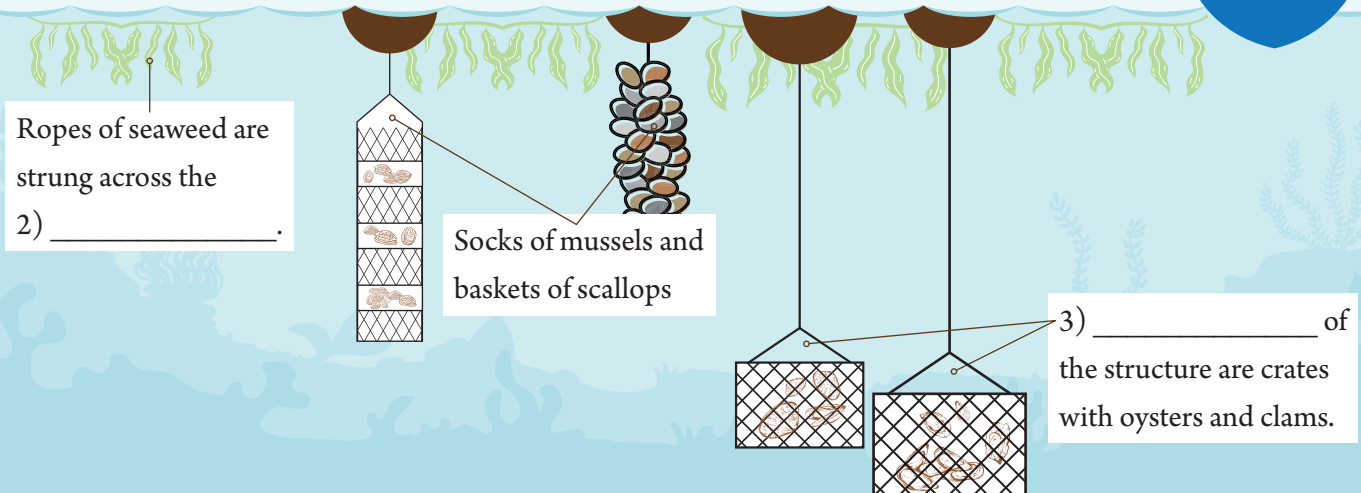




## Future farming challenges

- The rapidly growing global population, combined with changes in people's diets, will require 50% more food production by 2050.
- 1) \_\_\_\_\_ for agriculture is running out, and existing farmland is being degraded.

## A solution: 3D ocean farming



## Benefits of 3D ocean farming

- **Efficient:** Using the entire vertical 4) \_\_\_\_\_ below a certain area of ocean to produce high yields in a small amount of space
- **Clean:** Growing food without using any fertilizers, 5) \_\_\_\_\_, antibiotics, or fresh water
- **Regenerative:** Improving the marine environment and supporting 6) \_\_\_\_\_ to thrive
- **Water-purifying:** 7) \_\_\_\_\_ filter carbon, nitrogen, and pollutants.
- **Versatile:** Using seaweed as food, a fertilizer, a(n) 8) \_\_\_\_\_ alternative, and a biofuel source
- **Sustainable and accessible:** Focusing on eco-friendly practices and being available to diverse communities

## Viewing and discussing

### Work in groups and discuss the questions.

1. Do you think 3D ocean farming could be a viable solution to food security challenges worldwide? Why or why not?
2. The video clip mentions that “There are similar ideas out there that use different crops and different animals together to maximize harvests.” Can you think of any examples of such ideas?



# Exploring the frontier



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**maize** /merz/ *n.* 玉米

**homogeneity** /ˌhəʊməʊdʒəˈni:əti/  
*n.* 同类

**food sovereignty** /ˈsəʊvrɪnti/  
*n.* 粮食主权

**indigenous** /ɪnˈdɪdʒənəs/  
*a.* 土生土长的

**underutilized** /ˌʌndəˈju:tɪlaɪzd/  
*a.* 未充分利用的

**domestication** /dəˌmestɪˈkeɪʃən/  
*n.* 培育

**niche** /niːʃ/ *n.* 生态位

<sup>1</sup> **T**oday, just a handful of crops dominate our diets, with wheat, rice, and corn (also known as **maize**) accounting for almost half of the world's daily caloric intake. Yet, scientists say that a rich **tapestry** of over 7,000 **edible** plant species exists, largely overlooked, right in front of our eyes. The striking contrast between our heavy **reliance** on a few species and the **abundance** of edible plants available in nature **unveils** a critical issue in modern agriculture.

<sup>2</sup> Increasing **homogeneity** in food systems raises concerns about food and nutrition security, **food sovereignty**, and environmental sustainability. With global food demand expected to increase significantly by 2050, the need to rethink our agricultural **paradigms** calls for urgent action.

<sup>3</sup> Recent trends in food and environmental science might give us a glimpse of hope, such as the **revitalization** of what we now call forgotten crops, also known as **indigenous**, lost, traditional, or **underutilized** crops. These crops, once cornerstones of ancient diets, offer a **repository** of nutrition and resilience that could be key to future sustainability.

<sup>4</sup> Throughout history, people worldwide have relied on diverse crops for **subsistence**. These crops, originating from the **domestication** of wild species, date back to the early days of human civilization, where agriculture symbolized the intimate relationship between people and the environment. Each of them adapted to its unique **ecological niche** both naturally and through selective **cultivation**. Natural selection favors **traits** enhancing survival in nature, whereas the practice of agricultural





selection is **intentional**, with farmers breeding plants for desirable traits like higher yields, sweeter fruits, or pest **resistance**.

<sup>5</sup> Yet, despite their importance, these locally adapted and nutritious crops have rapidly slipped into **obscurity**, **displaced** by the rise of modern agriculture. Since the **green revolution** of the mid-20th century, the **advent** of industrial farming has **culminated** in a significant reduction in agricultural diversity.

**green revolution** *n.* 绿色革命

<sup>6</sup> This has not come without consequences: The increasing reliance on a limited selection of crops has **progressively** undermined the resilience of our food systems. The more homogenous a system is, the more vulnerable it becomes to pests, diseases, and environmental stresses. On top of that, the decline of traditional crops has **eroded** the knowledge related to their cultivation and **culinary** uses, threatening the collective **agronomic** heritage that sustained communities for generations and disconnecting peoples from the roots of their cultural identity.

**agronomic** /ægrə'nomɪk/  
*a.* 农学的

<sup>7</sup> But why is the disappearance of these crops a threat to the health of our food systems, and what are the benefits of their rediscovery? There is broad evidence that cultivating forgotten crops could offer abundant environmental and nutritional benefits. First, these plants are often resilient to **adverse** climate conditions and poor soil quality – an ability not to be underestimated in the face of the climate crisis. This resilience reduces the need for many external inputs, such as water, fertilizers, and pesticides, promoting sustainable farming practices and boosting soil fertility.

<sup>8</sup> From a health perspective, forgotten crops are real treasure chests of vitamins, **minerals**, and essential nutrients. This is due both to the quality of the soil they grow in and to their **genetic** heritage, which has been largely preserved through traditional farming methods. Crops like **teff**, **fonio**, **moringa**, and **amaranth** are not just naturally **robust** but also nutritionally rich. They could be critical in addressing **micronutrient deficiencies**, especially in regions with limited food diversity and nutrition insecurity.

**teff** /tef/ *n.* 埃塞俄比亚画眉草  
**fonio** /'fəʊniəʊ/ *n.* 福尼奥米  
**moringa** /mə'riŋgə/ *n.* 辣木  
**amaranth** /'æməərənθ/ *n.* 苋米  
**micronutrient** /,maɪkrəʊ'nju:triənt/  
*n.* 微量营养元素

<sup>9</sup> Although forgotten crops represent a valid solution to some of the **multifaceted** issues affecting our current food systems, several challenges prevent the widespread revitalization of these hidden **gems** from the past.



- 10 One of the greatest limitations is the lack of awareness and knowledge about these plants, both among farmers and consumers. The major decline in their cultivation has created a profound disconnect between these time-tested solutions and modern food systems. Bridging this divide is challenging, as it requires a systemic shift that not only brings these crops back to our fields but also **realigns** modern agricultural practices with ancient wisdom.
- 11 There are several **misconceptions** about the taste, cooking methods, and market appeal of these crops, which can further **impede** their reintroduction. Although creating a market demand for these species is **imperative** to effectively reintroduce them into our diets, it is easier said than done. Firstly, it involves educating consumers about the benefits and culinary characteristics of these crops that are now long forgotten. Secondly, it requires supporting farmers throughout the **transition** to cultivate them. This is not an easy job: It necessitates providing access to seeds, economic incentives, and capacity building on sustainable farming practices.
- 12 In addition to these challenges, there is a real risk of market-driven **exploitation** if these crops become trendy in wealthier countries. As seen with **quinoa**, **avocados**, and other superfoods, an increase in demand can quickly lead to over-cultivation and environmental degradation in the regions where these crops are traditionally grown. This not only stresses local ecosystems but can also lead to social and economic issues for local communities in growing regions. For instance, as these crops become more **lucrative** on the global market, local prices may rise, making them unaffordable for local populations.
- 13 Reintroducing forgotten crops is a critical step toward consolidating more sustainable and resilient food systems. They can help us redesign more environmentally appropriate agricultural practices while boosting the nutritional **profile** of our modern diets. However, cultivating these crops is not just about planting their seeds; it is about cultivating a new market, a culture, and an appreciation for their unique value.
- 14 Effective change requires a **holistic** approach. Essential first steps toward reintegrating these valuable crops into our food systems and collective **consciousness** include policymaking that **fosters agrobiodiversity** both at the farm and the market level, scientific research that deepens our understanding of these crops, and educational **outreach** that informs and **empowers** us as consumers.





## Reading and synthesizing

### Global understanding

The passage is divided into six parts, each exploring a specific facet of the topic. Read the passage and match each part with its corresponding main idea.

Paras. 1-2	⇒	<b>A</b> Cultivating forgotten crops can provide significant environmental and nutritional benefits.
Para. 3		<b>B</b> A holistic approach is needed to reintegrate forgotten crops into modern food systems.
Paras. 4-6		<b>C</b> The reliance on just a few crops threatens food security and sustainability, necessitating urgent agricultural reform.
Paras. 7-8		<b>D</b> Revitalizing forgotten crops may be key to future sustainability in agriculture.
Paras. 9-12		<b>E</b> The shift to modern agriculture has reduced crop diversity and undermined food system resilience.
Paras. 13-14	⇒	<b>F</b> The reintroduction of forgotten crops faces several challenges.

## Detailed understanding

Read the passage again and examine the underlying causes and consequences of the disappearance of forgotten crops, as well as the advantages and obstacles linked to their revival. Then complete the notes with the words or expressions from the passage.

### Forgotten crops

Forgotten crops are indigenous, lost, traditional, or underutilized crops that were once staples in ancient diets.



#### Causes

##### of their disappearance

- Agricultural selection prioritizes crops with 1) \_\_\_\_\_ such as higher yields, sweeter fruits, or pest resistance.
- The rise of 2) \_\_\_\_\_ led to a decline in agricultural diversity.



#### Consequences

##### of their disappearance

- Weakening the 3) \_\_\_\_\_ of food systems and increasing the vulnerability of crops
- Eroding the knowledge related to their 4) \_\_\_\_\_
- Threatening agronomic heritage and the roots of peoples' 5) \_\_\_\_\_



#### Benefits

##### of their reintroduction

- Reducing the need for many 6) \_\_\_\_\_ like water, fertilizers, and pesticides thanks to their resilience
- Being valuable for addressing 7) \_\_\_\_\_ since they are rich in essential nutrients



#### Challenges

##### of their reintroduction

- A lack of 8) \_\_\_\_\_ about these plants among farmers and consumers
- A number of 9) \_\_\_\_\_ about the taste, cooking methods, and market appeal of these crops
- A risk of 10) \_\_\_\_\_





## Thinking globally



**In addition to the forgotten crops referred to in the passage, such as teff, fonio, and moringa, there are other examples. Work in groups and discuss the questions.**

1. What other forgotten crops can you identify? Conduct research and develop a list of these crops, noting down the name of each crop and its geographical cultivation range (local, national, or global).
2. If you had the opportunity to reintroduce a forgotten crop to tackle the issue of food security, which crop would you choose, and why? Explain your choice from the following aspects:

Nutritional value

Economic implications

Cultural significance

Geographical suitability

Environmental benefits

3. How do you plan to reintroduce the forgotten crop you have selected? Outline your strategy, considering practical steps and potential challenges.



## Enhancing writing skills

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### Writing a problem-solution essay on food security



The passage highlights the issue of food security on a global scale and proposes a viable solution. It serves as a classic example of a problem-solution essay aimed at tackling real-world challenges and presenting effective strategies. While there are numerous ways to structure such an essay, a widely accepted one is outlined below.

First, articulate the problem and underscore the significance of addressing it. If the problem is new or not widely recognized, explain how it works and what potential consequences it may have. For a prevalent problem, tell readers what happens if the problem is not solved. Whatever the case may be, your objective is to convince readers of the urgency and relevance of this issue.

Second, propose a logical and feasible solution to the identified problem. To strengthen your argument, consider incorporating the following points:

- Introduce your solution properly.
- Explain how this solution effectively addresses the problem.
- Support your solution with evidence, such as expert opinions, personal experiences, official statistics, research findings, or relevant examples.

Finally, the essay should address the potential challenges or limitations of the proposed solution, such as economic constraints or implementation difficulties. This helps provide a balanced perspective on the solution's feasibility and demonstrate a critical and thoughtful approach to problem-solving.

**Task 1** Reread the passage and analyze how it aligns with the structure outlined above. Then reflect on how effectively the logical structure enhances the overall persuasiveness of the passage.

**Task 2** Choose a specific problem related to food security and write a problem-solution essay of no less than 150 words.



# Improving language skills

## Agricultural terms

Complete the sentences with the agricultural terms given below. Change the form if necessary.

domestication      food sovereignty      underutilized crop  
ecological niche      micronutrient deficiency

1. \_\_\_\_\_ in cultivated soils and plants are a global problem that adversely affects crop production and plant nutritional value, as well as human health and well-being.
2. The process of changing wild plants and animals to make them more useful to humans is referred to as \_\_\_\_\_.
3. \_\_\_\_\_ have specific characteristics, such as availability of nutrients, temperature, terrain, sunlight, and predators, which dictate how and how well a species survives and reproduces.
4. \_\_\_\_\_ ensures that the people who produce, distribute, and consume food should control the mechanisms and policies of food production and distribution.
5. Teff and fonio are \_\_\_\_\_ that have been largely overlooked in modern agriculture despite their potential to promote sustainable farming practices.

## Translating agriculture-related materials

Translate the paragraph into English.

民为国基，谷为民命。粮食事关国运民生，粮食安全是国家安全的重要基础。新中国成立后，中国始终把解决人民的吃饭问题作为治国安邦的首要任务。经过艰苦奋斗和不懈努力，中国在农业基础十分薄弱、人民生活极端贫困的基础上，依靠自己的力量实现了粮食基本自给，不仅成功解决了 14 亿人口的吃饭问题，而且居民生活质量和营养水平显著提升，在保障粮食安全上迈出了关键一步。



Scan the code and complete more language exercises on Ucampus.

# Perennial rice:



Log on to Ucampus for interactive learning.

## Cultivating a sustainable future

**seedling** /'si:dlɪŋ/ *n.* 种苗

**perennial** /pə'reniəl/ *a.* (植物) 多年生的

**hybridize** /'haɪbrɪdaɪz/ *v.* (使) 杂交

**embryo** /'embri,əʊ/ *n.* 胚

**tissue** /'tɪʃu:/ **culture** *n.* 组织培养

**crossbreed** /'krɒsbri:d/ *v.* 杂交繁育

- Traditionally, most rice farmers plant new **seedlings** every year, a process that requires time, energy, and costly inputs like fertilizers and pesticides. However, in the fertile fields of Yunnan, China, a new option has captured the imagination of scientists and farmers alike: **perennial** rice plants that regrow year after year.
- The **quest** to find a new way to grow rice began in the 1970s when the Food and Agriculture Organization of the United Nations advocated for a shift from annual to perennial crop varieties. This **initiative** sparked inspiration among scientists worldwide, including those in China. However, the path to developing a **viable** perennial rice variety was **fraught** with trials and **tribulations**. It wasn't until the mid-1990s that Chinese researchers made a significant breakthrough: A variety of annual Asian rice was **hybridized** with a wild perennial relative from Africa. The resulting **embryo** was **fragile** and wouldn't normally survive, but scientists adopted a laboratory technique known as **tissue culture** to cultivate a new hybrid rice plant. This new plant had retained permanent living roots, **akin** to its African parent, while also being viable for **crossbreeding** with standard cultivated rice. After decades of experimentation and **refinement**, the successful variety, **designated** Perennial Rice 23 (PR23), was ultimately introduced to Chinese farmers in 2018.

Perennial rice experimental field in Yunnan Province



3 Perennial rice presents **substantial** economic advantages. By eliminating the need for annual replanting, it markedly reduces costs and boosts profits. Farmers growing perennial rice could save about 60% of labor and nearly half of input costs in each regrowth cycle. While the annual yield of perennial rice varies across different study locations, its profits are found to range from 17% to 161% higher than those of elite annual rice. These economic benefits position perennial rice as an appealing option for farmers, particularly in regions where labor is both scarce and expensive.

4 In addition to economic gains, perennial rice provides notable environmental benefits. Its deep roots have been shown to boost **soil organic carbon** and nitrogen levels, which in turn enhances the soil's ability to retain more water. Furthermore, the practice of **no-tillage** helps maintain soil structure, which promotes the **oxidative** capacity of **methane**-oxidizing **bacteria**, ultimately leading to reduced methane **emissions**. In contrast, plowing in annual rice paddies can increase methane emissions by over 50%.

**soil organic carbon** *n.* 土壤有机碳

**no-tillage** /'nəʊ'tɪlɪdʒ/ *n.* 免耕法

**oxidative** /ɒk'sɪdətɪv/ *a.* 氧化的

**methane** /'miːθeɪn/ *n.* 甲烷

**bacteria** /bæk'tɪəriə/ *n.* 细菌

**emission** /ɪ'mɪʃn/ *n.* 排放物

5 The success of perennial rice has sparked global interest. In 2018, perennial rice technology was introduced to Africa as a South-South cooperation program. A notable **milestone** was reached in 2022 when the perennial rice variety Yunda 107 successfully passed national testing and **registration** in Uganda, paving the way for its commercial adoption across the continent. Countries participating in the Belt and Road Initiative, including Laos, Thailand, Cambodia, Vietnam, Myanmar, and Bangladesh, have engaged in research collaborations with China, demonstrating international confidence in the immense potential and applicability of perennial rice technology. This global collaboration **underscores** China's **commitment** to addressing global food security challenges while sharing innovative agricultural technologies and fostering sustainable development.

6 The development and **promotion** of perennial rice mark a significant step in the advancement of sustainable agriculture. As international collaborations and research efforts progress, this groundbreaking crop is **poised** to play a crucial role in shaping a more resilient and food-secure future for generations to come.

## Getting insights from China

### Understanding essential information

Read the passage and complete the profile about perennial rice with information from the passage.

## Perennial rice

### Development process

- A significant breakthrough made in the mid-1990s:

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- Challenges with the initial embryo and improvement:

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### Benefits

- Economic benefits:

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- Environmental benefits:

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### Global adoption

- Key progress:

> In 2018:

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> In 2022:

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## Exploring in depth

**Work in groups and conduct a small-scale research project to delve deeply into the development process of perennial rice. Then talk about the key factors that have contributed to China's achievements in this field. The following aspects are for your reference.**

- Technological advancements
- Experimental approaches
- Research methodologies
- Guiding philosophies

## Applying in a global context

**Work in groups and discuss the questions.**

1. What challenges might arise when introducing perennial rice to different countries? You may consider cultural, technological, and economic factors.
2. What strategies could be implemented to address these challenges?



## Improving language skills



Scan the code and complete the language exercises on Ucampus.



## Getting on the stage

### Delivering a speech on China's contributions to global food security

*In this unit, we have examined various strategies to address global food security challenges. As a student representative at your university's youth forum on food security, you are going to deliver a three-minute speech at the opening ceremony, highlighting China's innovative approaches to tackling food security issues.*

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#### Step 1 Collect information

Collect information from diverse sources, such as official reports, scientific journals, reliable news outlets, books, etc. You may also refer to the passage “Perennial rice: Cultivating a sustainable future.” When you collect information, consider the following questions:

- What is the background of global food security, and why is it an urgent issue?
- What innovative approaches has China implemented to address food security challenges?
- What are the outcomes and impacts of these approaches?

#### Step 2 Structure your speech

Construct an outline for your speech using the information gathered. The outline may include three main parts: an introduction with facts about global food security issues, a body presenting China's innovative approaches and achievements in addressing these issues, and a conclusion summarizing key points and suggesting future directions.



### **Step 3** Draft your speech

Write your speech based on the outline and the information you collected.

#### **Tips**

- Use clear and straightforward language to ensure your message is easily understood. Incorporate useful expressions and sentences in this unit to enrich your language.
- Simplify complex ideas by breaking them down into digestible concepts. Provide clear explanations or examples to aid comprehension.
- Use transitional phrases or sentences to seamlessly connect one main point to the next, thus maintaining a smooth flow throughout your speech.

### **Step 4** Rehearse your speech

Practice your speech thoroughly to refine your delivery and ensure it stays within three minutes. Consider rehearsing in front of a friend who may provide valuable feedback and suggestions. Additionally, prepare potential questions the audience may ask to enhance your confidence.

### **Step 5** Deliver your speech

Deliver your speech in class. Use a proper tone, appropriate body language, and eye contact to engage the audience effectively. After your speech, invite questions to encourage interaction and discussion.



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