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UNIT 9

The truth about human population decline

Ex. 1. Discuss the questions below

1. What are some factors contributing to the shrinking population in certain parts of the globe?
2. How has world population growth changed since the 1960s?
3. What are some potential consequences of low fertility and population aging?
4. How might societies react to the challenges posed by a smaller, older population?

Ex. 2. Match the words and expressions to their definitions

Definitions:

a. The study of human populations, including their size, structure, distribution, and changes over time.
b. The total number of people living in a specific area or region.
c. To burden or overwhelm someone or something with excessive work, information, or responsibility.
d. A situation where both parties involved receive advantages or gains that are advantageous to each other.
e. The process by which the average age of a population increases due to longer life expectancy and declining birth rates.
f. The speed at which something, such as a population or economy, is increasing over time.
g. Having the ability to recover quickly from difficulties or setbacks.
h. The reduction in the number of people living in a particular area or region.
i. A condition where the birth rate is significantly below the replacement level needed to maintain a stable population.
j. The amount of money required to hire workers for a specific job or project.
k. The increase in the number of individuals in a population over a specific period of time.
l. To decrease in size, quantity, or importance.

Words:

1. population growth
2. human population
3. demography
4. mutual benefit
5. low fertility
6. growth rate
7. shrink
8. labor cost
9. overload
10. population aging
11. resilient
12. depopulation

Ex. 3 Listen to the lecture (file 9.1) and answer the questions

1. How does the author compare the population of Earth to stars in the night sky?
2. What is the difference between what's happening on the surface and the tectonic forces beneath when it comes to world population growth?
3. What are some examples of countries that are experiencing or will soon experience shrinking populations?

4. How have fertility rates changed globally since the 1960s, and what impact does this have on population aging and depopulation?
5. Why do some people believe that arranged marriages are better than love marriages?
6. How does the author describe the demographic shift taking place in modern human society?
7. What are some potential consequences of failing to adapt to the changing demographics and clinging to the status quo?
8. How does a fearful world differ from a head in the sand world in terms of population dynamics and societal attitudes?
9. What are some characteristics of a resilient world in terms of population planning and sustainable systems?
10. What is the author's main message or argument in the text?

Ex. 4 Discuss the questions

1. What are some of the main reasons for population decline in developed countries?
2. How does population decline affect the economy and workforce of a country?
3. Can you think of any social or cultural implications that arise from population decline?
4. In what ways can governments encourage population growth to counteract decline?
5. Are there any potential benefits associated with population decline? If so, what are they?
6. How does population decline impact healthcare systems and services?
7. What role does immigration play in addressing population decline?
8. Do you believe that population decline is a global issue, or is it more prevalent in certain regions?
9. Are there any strategies or policies that have been successful in reversing population decline in specific countries?
10. How might population decline influence urban planning and infrastructure development?

Ex. 5 Fill in the gaps in the sentences, then translate the sentences into Russian

fertility, population (2), costs, demography, human, rate, populous, trade-off, growth (2), labor, depopulation, overloaded, lower

1. Earth is currently experiencing a _____(1) _____(2) explosion.
2. The birth or _____(3) _____(4) in the population decreases or the death rate increases as the population density increases.
3. Improved health , _____(5) _____(6) , and better nutrition will depend on greater literacy and social and civic responsibility.
4. Whatever the exact numbers the fact remains that _____(7) did happen on a catastrophic level.
5. In 1950 , only three of the world's most _____(8) cities were in the developing world.
6. Society's ability to cause such disruption is a relatively recent phenomenon , strongly influenced by _____(9) and technological development.
7. The anoxic reactor is _____(10) with nitrate and the excess nitrate will be returned to the aerobic reactor.
8. Biological fouling , jamming by sand , and high _____(11) _____(12) usually force the abandonment of the seasonal adjustments.
9. The processes of _____(13) _____(14) are changing in most developing countries as birth and death rates fall.
10. Experience shows that in agricultural development there is almost inevitably some degree of _____(15) between the different system properties.

Ex. 6 Listen to the recording (file 9.2) and translate the sentences into Russian

Ex. 7 Translate the sentences into English

1. Распространение человеческих популяций не похоже на рост и сокращение численности населения в мире природы.
2. Преимуществами фитопланктона являются быстрые темпы роста и высокая продуктивность.
3. Ирландия страдала от сокращения численности населения с 1840-х годов из-за последствий картофельного голода, эмиграции, поздних браков и низкой рождаемости
4. Дальнейшие исследования показали, что небольшие города и даже участки сельскохозяйственной местности больше не испытывают депопуляции, но в них проживает все большее число людей.
5. Расположенная в юго-восточной части Соединенных Штатов, Флорида является четвертым по численности населения штатом страны.
6. Причины этого изменения многообразны, такие как фундаментальные изменения в землепользовании и демографии.
7. Очевидно, что понимание этого процесса самоочищения важно для предотвращения перегрузки экосистемы ручья.
8. Растущие затраты на рабочую силу и нехватка рабочей силы для уборки урожая ускорили разработку широкого спектра комбайнов по всему миру за последние 40 лет.
9. Эти мероприятия тесно связаны с ускоренным ростом населения и развитием прибрежных водоразделов.
10. Эта модель легко обобщается на любое количество видов, которые имеют компромисс между конкурентоспособностью и способностью к колонизации.

Ex. 8 Listen to the text (file 9.3) and choose the correct answers. Then read the text in the transcript section and translate it into Russian.

1. What does population decline refer to?
A. An increase in the number of people living in a particular area over time.
B. A decrease in the number of people living in a particular area over time.
C. The migration of people from rural areas to cities.
D. The aging of the population in developed countries.

2. Why are birth rates decreasing in developed countries?
A. Changing social norms and increased access to contraception.
B. Increased life expectancy and improved living conditions.
C. Emigration and urbanization.
D. The desire for larger families and limited access to healthcare.

3. What is one consequence of an aging population?
A. Increased life expectancy.
B. Strain on social welfare systems and healthcare services.
C. Loss of skilled workers and professionals.
D. Revitalization of rural areas.

4. How does emigration contribute to population decline?
A. It leads to a loss of skilled workers and professionals.
B. It increases the number of people living in rural areas.
C. It improves living conditions in urban areas.
D. It encourages higher birth rates.

5. What impact does urbanization have on population decline?
A. It leads to a decrease in birth rates.
B. It results in a brain drain of skilled workers.
C. It promotes balanced regional development.
D. It revitalizes rural communities.

6. What challenges do governments and policymakers face due to population decline?
A. Encouraging higher birth rates and attracting skilled immigrants.
B. Implementing effective policies for sustainable population growth.
C. Addressing the needs of an aging population.
D. All of the above.

7. What is the author's main message regarding population decline?
A. Governments should focus on attracting skilled immigrants.
B. Population decline is a positive development for society.
C. Effective policies are needed to address the challenges of population decline.
D. Urbanization is the main cause of population decline.

Ex. 9 Discuss 4 opinions, which one do you agree with most and why

Sarah: "I personally think population decline is a really bad thing. My grandparents used to tell me stories about how their neighborhoods were always bustling with people and how they could rely on their neighbors for anything. Nowadays, it's different. I live in a small town where the population has been declining for years, and it feels empty and lonely. There aren't enough young people to support local businesses, and there are hardly any children playing outside. It's just sad."

Mike: "I completely disagree with Sarah. I think population decline is actually a good thing. Look at the big cities - they are overcrowded and polluted. With a smaller population, there would be less traffic, less competition for job opportunities, and overall better quality of life. I moved from a city with millions of people to a quieter town, and I can't tell you how much happier I am now."

Emily: "I'm torn on this topic. On one hand, population decline means less strain on resources and the environment. But on the other hand, it also means declining economic growth. I see both sides. For instance, in my hometown, the population has been shrinking, and some businesses have closed down as a result. However, it also means less pollution and congestion, which is a relief."

Jake: "Population decline breaks my heart. I grew up in a close-knit community with so many friends and neighbors. But now, with people moving away and families getting smaller, it feels like we're losing our sense of belonging. It's not just about numbers; it's about losing connections and traditions. I still remember the annual neighborhood barbecues we used to have, and now it's just a memory."

Ex. 10. Read the script of the lecture and summarize it

Ex. 11. Prepare a short talk on one of the following subjects

Personal topics:
1. My experience growing up in a small town with a declining population and how it shaped my perspective on community.
2. The impact of population decline on my hometown's economy and the steps taken to revitalize it.
3. How population decline has affected my family's decision to stay or move to a different area.
4. The challenges and opportunities I have encountered as a young professional in a region experiencing population decline.

5. My thoughts on the importance of preserving local culture and traditions in the face of population decline.

General topics:

1. The declining birth rate in many developed countries is a concerning trend. To what extent do you agree or disagree with this opinion?
2. Some people argue that population decline can lead to improved quality of life for individuals. Is this a positive or negative development?
3. With the increase in automation and artificial intelligence, some predict that population decline will not negatively impact economies. Do you agree or disagree with this view?
4. The aging population resulting from population decline poses various challenges for healthcare systems. To what extent do you think governments should be responsible for addressing these challenges?
5. As population declines in rural areas, urbanization continues to accelerate. Is this a positive or negative development?

UNIT 10

The simple solution to fast fashion

Ex. 1. Discuss the questions below

1. How do you value the clothes you own?
2. Have you ever repaired or altered your clothes? Why or why not?
3. What are some ways we can reduce fashion waste?
4. How can we change our mindset from disposability to valuing and caring for our clothes?
5. Do you think sustainable fashion is important? Why or why not?

Ex. 2. Match the words and expressions to their definitions

Definitions:
a. excessive or unnecessary consumption of resources or goods
b. to represent or express a particular idea, quality, or characteristic
c. the quality or state of being easily thrown away or replaced after use
d. not able to be maintained at the current rate or level
e. to wear something again, especially an item of clothing
f. causing severe damage or destruction
g. the length of time that something lasts or continues to exist
h. a type of clothing production that focuses on quickly producing inexpensive and trendy garments, often resulting in poor quality and unethical labor practices
i. to discard or get rid of something, usually by putting it in the trash
j. a temporary or short-lived fashion or style that is popular for a brief period of time
k. the release of carbon dioxide and other greenhouse gases into the atmosphere, primarily through human activities such as burning fossil fuels

Words:
1. overconsumption
2. devastating
3. disposability
4. unsustainable
5. passing trend
6. fast fashion
7. longevity
8. throw away
9. rewear
10. carbon emissions
11. embody

Ex. 3 Listen to the lecture (file 10.1) and answer the questions

1. What is the significance of the yellow dress in the author's grandmother's story?
2. How does the author describe their own experience with valuing clothes?
3. What is the cultural norm when it comes to valuing clothes, according to the author?
4. What are some examples of how people engage with clothing in a disposable way?
5. What are the environmental consequences of the fast fashion industry?

6. According to the author, how can we generate less fashion waste and reduce clothing production?
7. How does the author suggest changing our mindset towards clothing?
8. What is the story behind your sister's jeans and why are they valued by her?
9. Why does the author believe that repairing and caring for clothes is important?
10. What does sustainable fashion mean to the author?

Ex. 4 Discuss the questions

1. What is your opinion on the fast fashion industry? Do you think it has a positive or negative impact on society and the environment?
2. How would you define fast fashion in your own words?
3. Can you name some popular fast fashion brands that you are familiar with?
4. What are some of the advantages and disadvantages of buying clothes from fast fashion retailers?
5. Have you ever considered the ethical implications of purchasing fast fashion items? Why or why not?
6. In your opinion, what steps can individuals take to reduce their contribution to the fast fashion industry?
7. Are there any sustainable alternatives to fast fashion that you have explored or heard about?
8. How do you think the rise of online shopping has affected the fast fashion industry?
9. Do you believe that consumers have a responsibility to support more sustainable and ethical fashion practices? Why or why not?
10. Can you share any personal experiences or stories related to fast fashion that have influenced your perspective on the topic?

Ex. 5 Fill in the gaps in the sentences, then translate the sentences into Russian

legislation, away, thrown, overconsumption, devastating, trends, revolutionizing, longevity, unsustainable, embodied, carbon, emissions

1. The understanding of the causes and relative _____(1) of sand waves is poorly understood.
2. There are many good reasons why we should be cutting _____(2) _____(3) but tornadoes is not one of them.
3. _____(4) is a behavior in which society buys and uses more resources than it needs for a comfortable life.
4. These resources in the past were _____(5) _____(6) into large waste disposal sites , are now used to produce low cost organic compost for organic farming.
5. The administration began to draft _____(7) to improve the organization and funding of the field.
6. This is _____(8) in the nationally adopted principle of " keeping clean areas clean "
7. As mentioned before , global positioning systems are _____(9) beach and hydrographic profiling.
8. This program investigates the _____(10) of chemical contamination in space and time and determines biological responses to that contamination.
9. Some of the most _____(11) ecological disasters of the past century have been caused by invasive species.
10. Economic development is _____(12) if it increases vulnerability to crises.

Ex. 6 Listen to the recording (file 10.2) and translate the sentences into Russian

Ex. 7 Translate the sentences into English

1. Долговечность экономической отдачи является еще одним очень важным фактором при оценке политики в области развития.

2. Растущим источником выбросов углекислого газа в Китае является увеличение числа автомобилей.
3. Многие специалисты по этике считают, что корень проблемы кроется в богатом обществе, пристрастившемся к потреблению, или, более конкретно, к чрезмерному потреблению.
4. С другой стороны, технический прогресс позволил извлекать и повторно использовать многие материалы, которые до сих пор были бы выброшены и захоронены.
5. Федеральное правительство также предложило законодательство, устанавливающее обязательные лимиты выбросов для промышленности.
6. Ключевые переменные будут включать в себя основные механизмы стимулирования, размер проекта и ответные меры на проект.
7. Изобретение Теодором Майманом лазера в 1960 году создало новый оптический источник, позволивший разработать лидар и революционизировавший область дистанционного зондирования.
8. Анализ состоит из смеси линейной экстраполяции тренда и экспертного заключения.
9. Это один из самых опасных и разрушительных известных типов вулканических потоков.
10. Большинство прибрежных экосистем мира, которым потенциально угрожает неустойчивое развитие, расположены в пределах северных экваториальных зон.

Ex. 8 Listen to the text (file 10.3) and choose the correct answers. Then read the text in the transcript section and translate it into Russian.

1. What is fast fashion?
A. The production of clothing using eco-friendly materials and ethical manufacturing processes.
B. The quick and inexpensive production of clothing in response to the latest fashion trends.
C. The production of clothing that is made to last and can be recycled or upcycled.
D. The production of clothing that is expensive and exclusive to high-end brands.

2. What is one negative impact of fast fashion on the environment?
A. The use of eco-friendly materials in clothing production.
B. The excessive waste of unwanted clothing in landfills.
C. The promotion of recycling and upcycling of clothing.
D. The reduction of water, energy, and raw material consumption.

3. What is one concern regarding the working conditions in the fast fashion industry?
A. High wages and good working conditions for garment workers.
B. The outsourcing of production to countries with low labor costs.
C. The emphasis on quality over quantity in clothing production.
D. The provision of safe and comfortable working environments.

4. What does fast fashion promote?
A. A culture of overconsumption and disposable fashion.
B. Conscious choices and support for ethical and sustainable fashion brands.
C. Recycling and upcycling of clothing to reduce waste.
D. The production of clothing using eco-friendly materials.

5. What is the main focus of sustainable fashion?
A. The production of clothing using eco-friendly materials and ethical manufacturing processes.
B. The quick and inexpensive production of clothing in response to the latest fashion trends.
C. The promotion of recycling and upcycling of clothing to reduce waste.
D. The production of clothing that is expensive and exclusive to high-end brands.

6. What is the author's overall message about fast fashion?
A. Fast fashion is a positive industry that provides affordable and trendy clothing.
B. Fast fashion has no impact on the environment or workers in the industry.
C. Fast fashion comes at a high cost to the environment and workers in the industry.
D. Fast fashion is a sustainable alternative to traditional fashion production.

7. What can consumers do to address the negative impacts of fast fashion?
A. Buy more clothing to support the fast fashion industry.
B. Choose clothing made from synthetic materials that decompose easily.
C. Make conscious choices and support ethical and sustainable fashion brands.
D. Discard clothing after only a few uses to keep up with new trends.

Ex. 9 Discuss 4 opinions, which one do you agree with most and why

Molly: "I'm so against fast fashion, it's just destroying our planet! I remember last year when I bought a cheap t-shirt from a fast fashion brand, and after only a couple of washes, it completely fell apart. It was such a waste of money, and all that waste ends up in our landfills."

Jake: "I totally support fast fashion, man! It's all about affordability and style. I mean, who wants to spend loads of money on expensive clothes? Last week, I found this awesome jacket for only $20 at a fast fashion store. It looks great, and I didn't have to empty my wallet for it!"

Emma: "I'm kind of on the fence when it comes to fast fashion. On one hand, it's convenient and cheap, but on the other hand, it's not very sustainable. I guess it really depends on the situation. Sometimes, when I need something quickly and can't afford high-end brands, I go for fast fashion. But sometimes, I try to make more conscious choices and avoid it if I can."

Sophia: "Fast fashion breaks my heart, honestly. Those garment workers in developing countries are getting paid peanuts and working in terrible conditions just so we can buy cheap clothes. It's not fair, and it's not right. I watched a documentary last week about a young girl who had to work long hours in a fast fashion factory just to survive. It made me realize the human cost behind our shopping habits.

Ex. 10. Read the script of the lecture and summarize it

Ex. 11. Prepare a short talk on one of the following subjects

Personal topics:
1. My journey towards embracing sustainable fashion and its impact on my lifestyle.
2. How I discovered the joy of thrifting and its positive effects on both my wallet and the environment.
3. The role of fast fashion in shaping my personal style and how I have evolved to prioritize quality over quantity.
4. Exploring the ethical implications of fast fashion and the steps I am taking to make more conscious fashion choices.
5. My experience with upcycling and repurposing clothing items, and how it has sparked my creativity.
General topics:
1. Fast fashion has revolutionized the way we consume clothing, but at what cost? Is this a positive or negative development?

2. Some people argue that fast fashion is necessary to keep up with the latest trends, while others believe it promotes wastefulness and exploitation. To what extent do you agree or disagree with this opinion?
3. The rise of fast fashion has led to a throwaway culture where clothing is quickly discarded. Discuss the environmental consequences of this trend and propose possible solutions.
4. Fast fashion has made designer-inspired clothing more accessible to the masses, but does it devalue the artistry and craftsmanship of high-end fashion? Discuss.
5. In today's society, fashion is often seen as a reflection of one's identity. How has the prevalence of fast fashion influenced our perception of self-expression through clothing?

UNIT 11

The growing megafire crisis and how to contain it

Ex. 1. Discuss the questions below
1. Have you ever experienced a natural disaster? How did it affect you?
2. What measures can communities take to prevent wildfires from spreading into residential areas?
3. How do you think indigenous knowledge and practices can contribute to managing wildfires?
4. What role do you think technology can play in detecting and extinguishing fires?
5. How can individuals contribute to reducing the risk of wildfires in their own communities?

Ex. 2. Match the words and expressions to their definitions
Definitions:
a. the amount of carbon dioxide and other greenhouse gases released into the atmosphere as a result of human activities
b. to restore or make something appear fresh, young, or new again
c. a complex network or interconnected set of elements found in nature, including living organisms, their environment, and the interactions between them
d. referring to plants or ecosystems that have evolved to tolerate or benefit from periodic fires
e. the variety of plant and animal species in a particular habitat or ecosystem
f. relating to the air or flying, typically used to describe activities or views from above ground level
g. the act of extinguishing fires and preventing their spread
h. an uncontrolled fire that spreads rapidly through vegetation, often in forests or grasslands
i. covered with excessive growth, especially in relation to plants or vegetation
j. an underground layer of rock or sediment that holds water and allows it to flow
k. the practice of protecting and preserving forests from destruction or degradation
l. a landscape that is able to withstand and recover from disturbances such as wildfires or floods

Words:
1. wildfire
2. overgrown
3. fire-adapted
4. firefighting
5. carbon impact
6. biodiversity
7. rejuvenate
8. aerial
9. resilient landscape
10. aquifer
11. natural system
12. forest conservation

Ex. 3 Listen to the lecture (file 9.1) and answer the questions
Questions:
1. What is the main challenge posed by wildfires in the West and around the world?
2. How does wildfire impact carbon emissions, particularly in California?
3. What are megafires, and how have they been increasing in frequency in California?
4. Why did the speaker decide to start an organization called Megafire Action?
5. What are the three solutions proposed by Megafire Action to address the megafire crisis?

6. What steps can communities take to become fire-adapted?
7. According to the speaker, what lesson should be learned in order to solve the megafire crisis?
8. What challenges exist in reducing the risk of wildfires in American forests?
9. What actions need to be taken to address these challenges?
10. What potential benefits can innovative fire management bring to solving the wildfire problem?

Ex. 4 Discuss the questions

1. Have you ever heard of forest megafires before? If so, what do you know about them?
2. What factors contribute to the occurrence and spread of forest megafires?
3. How do forest megafires impact the environment and wildlife?
4. Can you think of any strategies or techniques that can be used to prevent or mitigate forest megafires?
5. In your opinion, what role does climate change play in the increasing frequency and intensity of forest megafires?
6. Are there any regions or countries that are particularly prone to forest megafires? Why do you think this is the case?
7. How do forest megafires affect human communities living near forests?
8. Do you believe that forest management practices have an impact on the occurrence and severity of forest megafires? Why or why not?
9. Are there any technological advancements or innovations being developed to better detect and combat forest megafires?
10. What steps can individuals take to raise awareness about the issue of forest megafires and promote sustainable forest management?

Ex. 5 Fill in the gaps in the sentences, then translate the sentences into Russian

ground-based, overgrown, aerial, conservation, forest, low-intensity, fire-resistant, firefighting, resilient, wildlife, biodiversity

1. Specific recommendations will likely vary due to different _____(1) habitat requirements in different regions of the country.
2. All of these events have a profound effect on the _____(2) in these places and contribute to ecological diversity.
3. Tax credits , subsidies , incentive programs , and carbon trading have been proposed to encourage _____(3) _____(4) and preservation.
4. Some of the other specialized services provided by lifeguards include marine _____(5) and flood rescue.
5. Hardwood trees , less flammable than conifers , and other _____(6) vegetation should be planted.
6. An agricultural field that is abandoned becomes _____(7) with plants that change over time as the field ages.
7. Our results suggest that the greatest opportunity to reduce monetary losses from tornado damage is for _____(8) tornadoes.
8. Their _____(9) observation was quickly confirmed by examining satellite measurements.
9. Satellite images and _____(10) photos are also used in order to improve the accuracy of the analysis.
10. Examples of _____(11) objectives are managed realignment and do nothing.

Ex. 6 Listen to the recording (file 11.2) and translate the sentences into Russian

Ex. 7 Translate the sentences into English

1. Данная программа предусматривает финансирование проектов, направленных на восстановление природных ресурсов и создание или расширение среды обитания диких животных.
2. Часто существует восприятие конфликта между необходимостью сохранения биоразнообразия и целью экономического развития.
3. Это был первый глобальный консенсус по лесам, в котором содержался призыв ко всем странам, особенно развитым, участвовать в сохранении лесов и лесовосстановлении.
4. В общей сложности в результате несчастных случаев на производстве погибло почти 170 человек, большинство из которых были работниками стройплощадки или пожарными.
5. Оливковое дерево, Olea europaea, очень зимостойкое: устойчиво к засухе, болезням и огню, оно может доживать до преклонного возраста.
6. Скелеты кораллов обросли водорослями, а рифовые рыбы и другие обитатели исчезли.
7. Влияние лишайников на сток значительно только при выпадении осадков низкой интенсивности.
8. Тот же аргумент справедлив и для наземных измерений солнечного поглощения по сравнению с измерениями тангенциального поглощения.
9. На рисунке 2 показан вид башни с высоты птичьего полета, погруженной в равномерный поток ветра.
10. Пастбищные угодья являются ценным и устойчивым экосистемным ресурсом, который поддерживает значительную часть растительной и животной жизни.

Ex. 8 Listen to the text (file 11.3) and choose the correct answers. Then read the text in the transcript section and translate it into Russian.

1. What is another name for a wildfire?
A. Forest fire
B. House fire
C. Car fire
D. Kitchen fire

2. How does a wildfire differ from other fires?
A. It spreads slowly.
B. It can't change direction.
C. It can jump over obstacles.
D. It only occurs in cities.

3. Where are wildfires most common?
A. Urban areas
B. Deserts
C. Wildland areas of the United States and Australia
D. Rainforests

4. What are some measures to reduce the threat of wildfires?
A. Using fire retardants
B. Constructing firebreaks
C. Controlled burns for vegetation management
D. All of the above

5. What can wildfires do to wilderness areas?
A. Cause damage to property and human life

B. Help maintain the natural balance between plants and animals
C. Stimulate growth and regeneration in forests
D. All of the above

6. Which plant species depend on the heat of wildfires?
A. Those that release seeds
B. Those that clear away competition from other plants
C. Those that rely on fire to release their seeds
D. All of the above

7. What can be done to reduce the likelihood of fire spreading in wildfire-prone areas?
A. Use fire-resistant materials for houses
B. Maintain landscapes
C. Avoid planting trees
D. None of the above

Ex. 9 Discuss 4 opinions, which one do you agree with most and why

Amy: "I'm totally against the idea of wildfires. My house got engulfed in flames last year, and I lost everything! It was devastating to see all my belongings turn into ash. We need to do whatever it takes to prevent wildfires from happening again!"

Jake: "I fully support the idea of controlled wildfires. They are essential for the ecosystem. Take my uncle's farm, for example. He deliberately sets controlled fires to get rid of dry vegetation and promote new growth. It helps maintain a healthy balance in nature."

Sarah: "Honestly, I can't decide whether wildfires are good or bad. On one hand, they cause destruction, like when my friend's wildlife sanctuary burnt down, killing many animals. But on the other hand, some plants rely on wildfires to spread seeds and rejuvenate the ecosystem. It's a tough call!"

Tom: "Oh, man! Let me tell you, wildfires make my blood boil! Last summer, I witnessed a massive inferno while camping in the mountains. The roaring flames were terrifying, and the thick smoke made it hard to breathe. I'll never forget that experience. Wildfires are a menace!

Ex. 10. Read the script of the lecture and summarize it

Ex. 11. Prepare a short talk on one of the following subjects

Personal topics:
1. My experience volunteering to help with wildfire relief efforts.
2. How wildfires have shaped my perspective on climate change and environmental conservation.
3. The impact of wildfires on my community and how we have come together to rebuild.
4. Reflecting on a personal encounter with a wildfire and the lessons I learned from it.
5. The role of firefighters in combating wildfires and the admiration I have for their bravery.
General topics:
1. Wildfires are becoming more frequent and intense due to climate change. To what extent do you agree or disagree with this opinion?
2. Some people argue that human activities, such as deforestation and improper land management, contribute to the severity of wildfires. Is this a positive or negative development?
3. Wildfires have devastating effects on ecosystems and wildlife. Discuss the importance of preserving and protecting natural habitats in the face of this threat.

4. With the increasing occurrence of wildfires, should governments invest more in fire prevention measures or focus on improving emergency response capabilities? Discuss both views and give your own opinion.
5. The media often portrays wildfires as destructive disasters, but they can also play a role in renewing ecosystems. To what extent do you believe wildfires have positive ecological impacts?

UNIT 12

The hidden wonders of soil

Ex. 1. Discuss the questions below

1. How much do you know about the world beneath our feet?
2. Have you ever thought about the importance of soil in our lives?
3. What are some ways that soil supports human life?
4. Why do you think soil is often underappreciated?
5. What can we do to protect and improve the health of our soils?

Ex. 2. Match the words and expressions to their definitions

Definitions:

a. Tiny living organisms such as bacteria, viruses, and fungi that are too small to be seen with the naked eye, playing important roles in various ecosystems.
b. Small solid fragments or grains of minerals, rocks, and organic matter that make up the composition of soil, varying in size from sand to silt to clay.
c. A dense forest located in regions near the equator that receives high amounts of rainfall throughout the year, characterized by a wide variety of plant and animal species.
d. Microscopic organisms found in soil, including bacteria, fungi, and protozoa, which play crucial roles in nutrient cycling and decomposition processes.
e. A group of diverse organisms that lack chlorophyll and obtain nutrients by absorbing them from their surroundings, playing important roles in decomposition and forming symbiotic relationships with plants.
f. A large geographical area on land with distinct climate, vegetation, and animal communities, such as deserts, grasslands, or forests.
g. The ability of soil or organisms to support and sustain plant growth, characterized by the presence of essential nutrients, organic matter, and favorable physical conditions.
h. A colorless gas produced by burning fossil fuels, respiration, and natural processes, essential for photosynthesis and a major contributor to global warming when present in excessive amounts.
i. An animal or organism that helps scatter seeds away from the parent plant, aiding in their distribution and increasing genetic diversity within plant populations.
j. The process by which green plants and some other organisms convert sunlight, carbon dioxide, and water into glucose (sugar) and oxygen, using chlorophyll in their cells.
k. The process of reducing pressure or releasing compressed gases, often referring to the decrease in atmospheric pressure experienced by divers as they ascend to the surface.
l. The natural process of breaking down rocks into smaller fragments or particles through physical (e.g., temperature changes) and chemical (e.g., water erosion) processes over time.
m. The process by which organic matter, such as dead plants and animals, is broken down into simpler substances by decomposer organisms, releasing nutrients back into the ecosystem.
n. A compacted mass or lump of soil particles held together by moisture, organic matter, or root systems, providing stability and structure to the soil.
o. To separate something into smaller parts or components, often referring to the process of breaking down complex molecules into simpler ones through chemical reactions or physical forces.
p. Any substance derived from living organisms or their remains, such as dead plants and animals, which contributes to soil fertility and nutrient cycling.

Words:
1. fungi
2. fertility
3. soil particles
4. seed disperser
5. tropical rainforest
6. decompression
7. carbon dioxide
8. decompose
9. photosynthesis
10. break down
11. microbial life
12. organic matter
13. soil microbe
14. terrestrial biome
15. soil clump
16. rock weathering

Ex. 3 Listen to the lecture (file 12.1) and answer the questions

1. What is the author's background and how did they become interested in studying soil?
2. How do soils support agriculture and terrestrial biomes?
3. How do plants and soil work together to transform carbon through photosynthesis?
4. What happens to the majority of soil carbon that is sequestered?
5. What has caused the loss of billions of tons of carbon from our soil over the last 12,000 years?
6. Why is the plow considered a major driver of soil carbon loss?
7. How much land is currently used for feeding and clothing people on this planet?
8. Why is it important to rebuild soil and put more carbon underground?
9. What are some of the organisms found in soil and what role do they play in the carbon cycle?
10. How does having more carbon in soil benefit agricultural fields?

Ex. 4 Discuss the questions

1. How does soil fertility affect crop production?
2. What are some factors that contribute to soil fertility?
3. Can you explain the concept of nutrient cycling in relation to soil fertility?
4. How do farmers enhance soil fertility through organic farming practices?
5. What role do microorganisms play in maintaining soil fertility?
6. Are there any negative impacts on soil fertility caused by human activities? If so, what are they?
7. Can you discuss the importance of pH levels in determining soil fertility?
8. How does soil erosion affect soil fertility and agricultural productivity?
9. What are some common methods used to assess soil fertility?
10. Can you provide examples of how different types of soil amendments can improve soil fertility?

Ex. 5 Fill in the gaps in the sentences, then translate the sentences into Russian

biome, decomposed, decompression, photosynthesis, fungi, soil, rock, particles, tropical, rainforest, weathering, dioxide, budding, terrestrial, carbon

1. Animal biomass in the terrestrial environment reaches a peak in the _____(1) _____(2) and in the savanna grasslands of Africa.
2. Unicellular fungi which are able to multiply asexually by a _____(3) process.

3. The annual precipitation for any region is one of the major factors in determining the _____(4) _____(5) that can exist.
4. Highly _____(6) peat burns with greater fuel efficiency than wood.
5. _____(7) converting carbon dioxide to water traps sunlight energy as an energy source for most life.
6. Another advantage is that nuclear power plants do not produce _____(8) _____(9) or any other greenhouse gases.
7. Such fires produce large amounts of gases and particles from biomass burning and _____(10) _____(11) lifted during the fires.
8. The bends , also known as _____(12) sickness , occurs when a diver ascends too rapidly.
9. Vascular plants like trees amplify the rate of _____(13) _____(14) by about an order of magnitude relative to simpler plant life.
10. Marine _____(15) grow across dead and decaying plant and animal matter by extending thin filaments called hyphae.

Ex. 6 Listen to the recording (file 12.2) and translate the sentences into Russian

Ex. 7 Translate the sentences into English

1. Мангровые заросли также аналогичны по своим функциям тропическим лесам, обеспечивая сопоставимую среду обитания для птиц, млекопитающих и насекомых.
2. В Швейцарии ветер быстро очищает альпийские луга от снега, но быстрая оттепель иногда приводит к сходу лавин, лесным пожарам и даже преждевременному распусканию почек на деревьях и кустарниках.
3. Наземные биомы включают тундры, тайгу, леса умеренного пояса, пустыни, луга и влажные тропические леса.
4. Этот вариант применим в первую очередь к компостируемым биотвердым веществам, которые также содержат частично разложившиеся органические наполнители.
5. Этот процесс производил кислород до того, как фотосинтез стал доминирующим.
6. Углекислый газ, который растворяется непосредственно в поверхностных водах, смешивается вниз и циркулирует на больших глубинах
7. Частицы естественной щелочной почвы могут быть выброшены в воздух, где они нейтрализуют кислоту.
8. Снижение пьезометрического напора влечет за собой снижение гидростатического давления, которое вызывает декомпрессию воды.
9. Механизм долгосрочного регулирования климата, включающий биологическое усиление выветривания силикатных пород, по-видимому, чрезвычайно устойчив к кратковременным воздействиям.
10. Применение грибов для очистки сточных вод еще не прошло стадию разработки.

Ex. 8 Listen to the text (file 12.3) and choose the correct answers (several options possible). Then read the text in the transcript section and translate it into Russian.

1. What does soil fertility refer to?
A. The ability of soil to sustain agricultural plant growth
B. The ability of soil to hold water and air
C. The ability of soil to provide a suitable environment for plant roots
D. The ability of soil to release nutrients from organic matter

2. Which of the following is NOT a physical property that affects soil fertility?
A. Texture
B. Structure

C. pH
D. Moisture-holding capacity

3. How can soil fertility be improved?
A. Through organic amendments
B. Through crop rotation
C. Through reduced tillage
D. Through synthetic fertilizers and pesticides

4. What is the purpose of cover cropping?
A. To prevent erosion
B. To suppress weeds
C. To improve soil structure
D. To add organic matter to the soil

5. Why is soil fertility crucial for sustainable agriculture?
A. It reduces the need for synthetic inputs
B. It improves crop resistance to pests and diseases
C. It enhances nutritional value of crops
D. All of the above

6. What is one major global challenge related to soil fertility?
A. Erosion
B. Acidification
C. Pollution
D. Salinization

7. Why is protecting and enhancing soil fertility important?
A. It ensures long-term agricultural productivity
B. It conserves natural resources
C. It mitigates climate change
D. All of the above

Ex. 9 Discuss 4 opinions, which one do you agree with most and why

Sam: "I don't believe in the idea that soil fertility is necessary for a successful garden. My mom has never added any fertilizers or compost to her garden, and it still produces an abundance of delicious vegetables every year."

Emily: "I strongly support the idea that soil fertility is essential for a successful garden. I have seen firsthand how enriching the soil with organic compost and fertilizers helps plants grow stronger and healthier. Last summer, my tomato plants grew over six feet tall and produced so many juicy tomatoes!"

Max: "I'm kind of on the fence about this topic. On one hand, I've tried adding compost to my garden and it seemed to improve the yield. But on the other hand, my neighbor doesn't bother with fertilizers, and her plants turn out just fine too. So I'm not sure if it really makes a significant difference."

Lily: "Oh my gosh! Soil fertility is absolutely crucial for a thriving garden! I remember when I first started gardening, I neglected to enrich the soil, and my poor plants struggled to grow. It was heart-

wrenching to see them wither and die. Now, I make sure to provide my baby plants with all the nutrients they need to flourish.

Ex. 10. Read the script of the lecture and summarize it

Ex. 11. Prepare a short talk on one of the following subjects

Personal topics:
1. My experience starting a small organic farm and improving soil fertility.
2. The impact of soil fertility on my family's generational farming practices.
3. How I turned my backyard into a thriving garden by enhancing soil fertility.
4. My journey as a soil scientist and the importance of soil fertility in sustainable agriculture.
5. The role of composting in improving soil fertility and its effect on my own garden.
General topics:
1. Soil degradation is a major threat to global food security. To what extent do you agree or disagree with this opinion?
2. The use of chemical fertilizers has significantly contributed to the decline in soil fertility. Is this a positive or negative development?
3. Organic farming practices prioritize soil fertility over high yields. Discuss the benefits and drawbacks of this approach.
4. Soil erosion is a consequence of poor soil management practices. How can we address this issue and improve soil fertility?
5. Industrial agriculture heavily relies on synthetic inputs to enhance soil fertility. Is this sustainable in the long run?

UNIT 13

A bold plan to protect 30 percent of the Earth's surface and ocean floor

Ex. 1. Discuss the questions below
1. How do you think wildlife biologists overcome the challenges they face in their profession?
2. Do you think it is important to protect endangered species? Why or why not?
3. What are some ways that individuals can contribute to wildlife conservation efforts?
4. Have you ever witnessed a change in the natural environment that affected a particular animal or species? If so, how did it make you feel?

Ex. 2. Match the words and expressions to their definitions
Definitions:
a. a barren and desolate area beneath the surface of the water with little or no marine life present
b. the process of restoring an area of land to its natural state by reintroducing native plant and animal species
c. the release of carbon dioxide and other greenhouse gases into the atmosphere, primarily as a result of human activities
d. a protected region of land or water managed to preserve its natural resources and biodiversity
e. a large area of land or water set aside by the government to protect its natural beauty and provide recreational opportunities for visitors
f. the process of capturing and storing carbon dioxide from the atmosphere, usually through natural or artificial means
g. an underwater ecosystem dominated by various species of seaweed, providing habitat for many marine organisms
h. the plants and animals that live in the ocean or sea
i. the combination of physical and biological factors that make up the conditions in the ocean or sea
j. to take actions that reduce the severity or impact of global climate change
k. the original inhabitants of a particular region or country who have distinct cultural traditions and often a deep connection to the land
l. a large open area of land covered with grass, especially one used for grazing
m. a designated zone in the ocean where fishing or any other form of resource extraction is prohibited
n. a protected area in the ocean where marine life is conserved and managed to ensure its long-term survival
o. the process of developing industries in a country or region, typically involving the use of advanced technology and machinery
p. a diverse underwater ecosystem formed by colonies of tiny coral polyps, supporting a wide range of marine life
q. to change the direction in which something, such as a river or current, moves or flows
r. in its original condition; unspoiled or untouched by human activity

Words:
1. marine life
2. reverse the flow
3. pristine
4. conserved area
5. underwater desert

6. carbon pollution
7. national park
8. coral reef
9. no-take area
10. marine reserve
11. marine environment
12. industrialization
13. indigenous people
14. carbon storage
15. seaweed forest
16. mitigate climate change
17. grassland
18. rewild

Ex. 3 Listen to the lecture (file 13.1) and answer the questions

Questions:
1. How did the author's childhood experiences influence their interest in marine life?
2. What changes did the author observe in the Mediterranean sea during their childhood compared to when they started scuba diving in the Medes Islands marine reserve?
3. Describe the transformation that occurred in Cabo Pulmo, Mexico after the creation of a no-take area.
4. What percentage of the ocean and land have been protected globally?
5. Why is it important to protect nature and rewild our planet?
6. What are the two things that need to be done to prevent a global disaster?
7. How can nature help capture excess greenhouse gases?
8. What benefits does biodiversity provide?
9. What objectives did the team of scientists and economists focus on when determining which areas of the ocean to protect?
10. What is the minimum amount of the ocean and land that should be protected according to the research conducted by the author's team?

Ex. 4 Discuss the questions

1. What are some of the main reasons why wildlife conservation is important?
2. Can you name a few endangered species and explain why they are at risk?
3. How do human activities contribute to the decline in wildlife populations?
4. In your opinion, what role should governments play in wildlife conservation efforts?
5. Are there any successful examples of wildlife conservation projects that you know of? If so, can you describe them briefly?
6. What are some challenges faced by organizations working towards wildlife conservation?
7. How does climate change impact wildlife habitats and biodiversity?
8. Do you think ecotourism can be an effective tool for promoting wildlife conservation? Why or why not?
9. What are some ethical considerations when it comes to wildlife conservation, such as captive breeding programs or reintroduction efforts?
10. How can individuals contribute to wildlife conservation in their everyday lives?

Ex. 5 Fill in the gaps in the sentences, then translate the sentences into Russian

areas, subsidized, industrialization, mitigate, no-take, national, absorbed, grassland, pristine, park, life, reserve, marine (2)

1. The twin driving forces of agricultural _____(1) have been technological developments and strong state support for agriculture.
2. Coral reefs provide important ecosystems for the survival of other _____(2) _____(3)
3. Some ecological problems can be addressed at the scale of a single patch -- a solitary agricultural field or _____(4) _____(5)
4. The biophysical operational principles included recommendations for minimum _____(6) _____(7) for each bioregion and each known habitat type.
5. About 49 percent of the land in the _____(8) _____(9) system is designated as wilderness.
6. The interaction of crust minerals with both _____(10) and polluted environments is called weathering.
7. The _____(11) around the perimeter of the evergreen cover is comprised of the low coastal sand ecological site group.
8. Some of the ultraviolet radiation that passes through this region of the atmosphere is _____(12) by the ozone layer.
9. Chemical fertilisers and pesticides are heavily _____(13) in many countries.
10. There are a number of legislative instruments in place to prevent and _____(14) accidents and their consequences.

Ex. 6 Listen to the recording (file 13.2) and translate the sentences into Russian

Ex. 7 Translate the sentences into English

1. Концентрация еще больше возросла по мере роста численности населения и индустриализации за последние 1000 лет.
2. Морская флора и фауна в водах Антарктики контролируется наличием морского льда.
3. Только в Новой Зеландии были созданы полностью охраняемые морские заповедники на срок, достаточный для определения долгосрочных последствий.
4. Морские охраняемые районы - это районы, где деятельность человека ограничена, или в случае с зонами покоя, вывоз животных и растений запрещен.
5. Федеральное правительство, которому принадлежит пляж как часть национального парка, не предоставило спасателей
6. Без достаточных запасов продовольствия самая нетронутая и красивая окружающая среда становится враждебным местом для жизни человека.
7. Деятельность человека привела к снижению продуктивности лесов и лугопастбищных угодий земли на 12 процентов.
8. Область, в которой поглощается вода, которая в конечном итоге достигает зоны насыщения в одном или нескольких водоносных горизонтах.
9. Это достигается за счет снижения затрат на землю, управленческие расходы и затраты на корма с помощью субсидируемых государством методов ведения сельского хозяйства.
10. В докладе также рассматриваются возможные стратегии реагирования, которые могли бы быть использованы для смягчения последствий изменения уровня моря.

Ex. 8 Listen to the text (file 13.3) and choose the correct answers. Then read the text in the transcript section and translate it into Russian.

Questions:

1. What is the primary objective of the Great Barrier Reef Marine Park?
A. To promote sustainable fishing practices
B. To generate revenue for Australia
C. To conserve the biodiversity of the reef ecosystem
D. To allow for unlimited recreational activities

2. Which zones in the Great Barrier Reef Marine Park have the highest level of protection?
A. Green zones
B. Yellow zones
C. Blue zones
D. All zones have the same level of protection

3. What are the main threats to the Great Barrier Reef Marine Park?
A. Rising ocean temperatures, pollution, and coastal development
B. Overfishing, tourism, and Indigenous communities
C. Climate change, plastic waste, and agricultural runoff
D. Coral bleaching, port expansions, and dredging

4. What strategies has the Great Barrier Reef Marine Park Authority implemented to address the challenges?
A. Monitoring and research programs, regulations, and sustainable practices
B. Increased fishing quotas, pollution permits, and tourism promotions
C. Habitat restoration projects, relocation of marine organisms, and climate change adaptation plans
D. None of the above

5. How does the Great Barrier Reef Marine Park contribute to Australia's economy?
A. By supporting industries such as tourism, commercial fishing, and scientific research
B. By selling coral reef souvenirs and merchandise
C. By providing employment opportunities for local communities
D. By attracting international investors for coastal development projects

6. What is the role of Traditional Owner groups in the management of the Great Barrier Reef Marine Park?
A. They have exclusive rights to fish and collect resources in the park.
B. They provide funding for conservation initiatives.
C. They work closely with the Great Barrier Reef Marine Park Authority to incorporate Indigenous knowledge and perspectives.
D. They are responsible for monitoring water quality and enforcing regulations.

7. What is the key factor in ensuring the long-term survival of the Great Barrier Reef Marine Park?
A. Global efforts to combat climate change and protect marine ecosystems
B. Increased funding from the Australian government
C. Expansion of the park's boundaries to include more areas
D. Implementation of stricter regulations on fishing and tourism activities

Ex. 9 Discuss 4 opinions, which one do you agree with most and why
Megan: "I'm totally against marine reserves! I mean, they're just restrictions that limit our freedom to fish and enjoy the ocean. It's not fair for us fishermen who rely on the ocean for a living. Just last week, my family and I went fishing, and because of the stupid marine reserve nearby, we couldn't catch anything worth keeping! It ruined our day."

Jake: "I'm all for marine reserves, man. We need to protect our precious marine ecosystems. Look, a couple of years ago, I went scuba diving in a marine reserve, and the biodiversity was out of this world! It was like swimming in an aquarium filled with colorful corals, vibrant fish species, and even sea turtles. It was so beautiful, and it made me realize how important it is to preserve these areas."

Taylor: "I don't know, guys. I'm really torn on this marine reserve thing. On the one hand, I understand the need to protect marine life and maintain ecological balance. But on the other hand, I also think it's essential for people to have access to these areas for recreational purposes. I guess the government should find a good balance that allows sustainable fishing practices while protecting the environment."

Amy: "Ugh, it seriously breaks my heart to see what's happening to our oceans. Marine reserves are crucial to save some of the most endangered species from extinction. Last summer, I volunteered at a marine rehabilitation center, and seeing the injured sea lions and dolphins hurt by overfishing and pollution was gut-wrenching. We need to take action now if we want future generations to experience the beauty of our oceans.

Ex. 10. Read the script of the lecture and summarize it

Ex. 11. Prepare a short talk on one of the following subjects

Personal topics:

1. My experience volunteering at a marine reserve and the impact it had on my understanding of marine conservation.
2. The challenges and rewards of scuba diving in marine reserves and witnessing the vibrant underwater ecosystem.
3. How my childhood visits to marine reserves inspired my passion for marine biology and environmental activism.
4. The importance of marine reserves in protecting endangered species and preserving biodiversity, based on my research and personal observations.
5. My journey of advocating for the establishment of marine reserves in my local community and the positive changes it has brought.

General topics:

1. Marine reserves are essential for the protection of marine ecosystems and biodiversity. To what extent do you agree or disagree with this opinion?
2. Some people argue that marine reserves restrict economic opportunities such as fishing and tourism. Is this a positive or negative development?
3. The establishment of marine reserves can be an effective strategy for mitigating the impacts of climate change on marine ecosystems. Discuss.
4. Marine reserves are not only beneficial for wildlife but also for local communities. To what extent do you agree or disagree with this statement?
5. In recent years, there has been an increasing global focus on creating marine reserves. Is this a positive trend, or are there potential drawbacks?

UNIT 14

Earth's original inhabitants and their role in combating climate change

Ex. 1. Discuss the questions below
1. How do microbes contribute to the balance of planetary chemical cycles?
2. In what ways can microbes help us with our climate problem?
3. Why do some people have negative associations with microbes?
4. How are microbiomes important for both human and planetary health?
5. What are some potential solutions for using microbes to address global problems like climate change and food insecurity?

Ex. 2. Match the words and expressions to their definitions
Definitions:
a. The process by which elements or compounds are continuously cycled and transformed through various chemical reactions in the environment.
b. A group of organisms that belong to the kingdom Fungi, including mushrooms, molds, and yeasts, which obtain nutrients by decomposing organic matter.
c. An outbreak of a disease that spreads rapidly and affects a large number of people worldwide, caused by a specific virus.
d. The ability of bacteria or other microorganisms to resist the effects of antibiotics, making infections more difficult to treat and control.
e. Referring to microorganisms or substances that can cause diseases or illnesses in living organisms.
f. A substance that provides nourishment and is essential for the growth, development, and maintenance of living organisms.
g. A dense layer or colony of bacteria that forms on a surface, such as rocks or soil, often found in aquatic environments.
h. The complete set of genetic material (DNA or RNA) present in an organism or a particular cell type.
i. A prolonged period of abnormally low rainfall or precipitation, resulting in water scarcity and dry conditions in an area.
j. The collection of microorganisms, including bacteria, viruses, and fungi, that inhabit a particular environment or organism, such as the human gut microbiome.
k. The variety and abundance of different types of microorganisms, including bacteria, viruses, fungi, and archaea, within a particular ecosystem.
l. Gases, such as carbon dioxide and methane, that trap heat in the Earth's atmosphere and contribute to the greenhouse effect, leading to global warming.
m. The overall well-being and sustainability of the planet, including the health of ecosystems, biodiversity, and human populations.
n. The process by which microorganisms, such as bacteria and fungi, break down organic matter into simpler compounds, releasing nutrients back into the environment.
o. The state of being without reliable access to sufficient quantities of affordable, nutritious food.
p. Photosynthetic bacteria that obtain energy from sunlight and release oxygen as a byproduct, commonly found in freshwater and marine environments.
q. Capable of adjusting or changing to different conditions or circumstances; flexible and versatile.

Words:
1. drought
2. antibiotic resistance
3. chemical cycle
4. genome
5. food insecurity
6. cyanobacteria
7. pathogenic
8. microbial diversity
9. bacterial mat
10. fungi
11. planetary health
12. nutrient
13. microbial decomposition
14. microbiome
15. viral pandemic
16. greenhouse gases
17. adaptable

Ex. 3 Listen to the lecture (file 14.1) and answer the questions

1. How do microbes contribute to keeping planetary chemical cycles in balance?
2. What is the human microbiome and why is it important?
3. Give an example of how microbiomes in water are critical for planetary health.
4. Why are soil microbiomes important for sustaining crops and other plants?
5. How can beneficial fungi help reduce stress on plants caused by climate change?
6. What is microbial decomposition and why is it essential for life on Earth?
7. How are researchers trying to co-opt microbial decomposition for sustainable biofuel production?
8. How might climate change affect microbial recycling in the environment?
9. How do microbes adapt to extreme conditions like the hot springs of Yellowstone?
10. How can soil microbiomes contribute to carbon sequestration and reducing greenhouse gas buildup in the atmosphere?

Ex. 4 Discuss the questions

1. What is a microbial community and how does it differ from an individual microorganism?
2. How do microorganisms interact within a microbial community?
3. Can you explain the concept of symbiosis in relation to microbial communities?
4. What are some factors that can influence the composition and diversity of a microbial community?
5. How do microbial communities play a role in nutrient cycling and ecosystem functioning?
6. Can you provide examples of different types of microbial communities found in various environments?
7. What are some methods used to study and analyze microbial communities?
8. How do disturbances, such as pollution or climate change, impact microbial communities?
9. Are there any applications or benefits of studying microbial communities in fields like medicine or agriculture?
10. Can you discuss any recent research findings or breakthroughs related to microbial communities?

Ex. 5 Fill in the gaps in the sentences, then translate the sentences into Russian

cyanobacteria, fungi, biofilm, particles, greenhouse, gases, nutrients, insecurity, microbial, food, soil, adaptable, diversity, pathogenic

1. Scientists are committed to researching new technologies and processes that do not put more _____(1) _____(2) into our air.
2. It is a very _____(3) species so can survive and thrive in many different conditions.
3. UV radiation breaks down many organic molecules and it can be used for destroying _____(4) organisms.
4. This chapter reviews the impacts of cropping management practices on soil _____(5) _____(6) and arbuscular mycorrhizal communities.
5. Marine _____(7) grow across dead and decaying plant and animal matter by extending thin filaments called hyphae.
6. Most of the problems affecting humans associated with toxin containing aquatic _____(8) have involved freshwater planktonic species.
7. On a continental scale , Africa is the leading example of _____(9) _____(10) in the world.
8. Researchers discovered in the 18th century that plants absorb essential mineral _____(11) as inorganic ions in water.
9. Natural alkaline _____(12) _____(13) can be swept into the air where they neutralize the acid.
10. Some biological aerated filters are operated with a backwash to remove excess _____(14) from the filter.

Ex. 6 Listen to the recording (file 13.2) and translate the sentences into Russian

Ex. 7 Translate the sentences into English

1. Двумя важными парниковыми газами являются углекислый газ и метан.
2. Насекомые чрезвычайно легко приспосабливаются к изменениям, но их присутствие может оказаться вредным.
3. Необходимы исследования антагонистического действия экономически важных видов сельскохозяйственных культур на другие патогенные грибы.
4. Одной из наиболее сложных сред является ризосфера, микросреда, в которой присутствует большое разнообразие микроорганизмов.
5. Грибы и водоросли не имеют зародышей и развиваются из спор.
6. Некоторые бактерии и цианобактерии обладают способностью утилизировать газообразный азот.
7. Недавняя политическая нестабильность препятствовала экономическому развитию страны, сказываясь на бедных слоях населения и усиливая отсутствие продовольственной безопасности
8. Вода переносит питательные вещества из почвы в тела растений через корни растений.
9. Ил состоит из частиц почвы, которые мельче и более гладкие, чем песок.
10. Бактерии растут на неподвижной твердой среде, образуя биопленку

Ex. 8 Listen to the text (file 13.3) and choose the correct answers. Then read the text in the transcript section and translate it into Russian.

1. What are microbial communities?
A. Groups of microorganisms that live together and interact with each other.
B. Groups of microorganisms that live alone.
C. Groups of microorganisms that are found only in the human gut.

D. Groups of microorganisms that are found only in the deep sea.

2. How do scientists study microbial communities?
A. By growing the microorganisms in the lab.
B. By extracting DNA from an environmental sample.
C. By studying the functions of individual microorganisms.
D. By using metagenomics to sequence the DNA of one microorganism at a time.

3. Why are microbial communities important?
A. They help to break down organic matter and recycle nutrients.
B. They protect us from harmful pathogens.
C. They help us digest food.
D. All of the above.

4. What is one challenge of studying microbial communities?
A. Most microorganisms in these communities can be grown in the lab.
B. DNA sequencing is a quick and inexpensive process.
C. Microbial communities are not diverse.
D. It is difficult to identify and classify all the species present in a community.

5. What is the main goal of studying microbial communities?
A. To understand the diversity and functioning of life on Earth.
B. To develop new ways to harness their power.
C. To solve some of the world's most pressing problems.
D. All of the above.

6. What is the role of microbial communities in human health?
A. They protect us from harmful pathogens.
B. They help us digest food.
C. They break down organic matter and recycle nutrients.
D. They have no role in human health.

7. What has advanced DNA sequencing technology allowed scientists to do?
A. Study microbial communities in more detail.
B. Grow microorganisms in the lab.
C. Classify all the species present in a community.
D. None of the above.

Ex. 9 Discuss 4 opinions, which one do you agree with most and why
John: "I think the idea of studying microbial communities is a waste of time. I mean, why do we need to know about tiny organisms that we can't even see? It's just pointless. I'd rather focus on something more practical, like finding a cure for diseases."

Jenny: "I totally support the idea of studying microbial communities! They play a crucial role in our environment and our health. For example, when I had a severe allergic reaction last year, it turned out that an imbalance in my gut microbiota was causing it. Understanding these communities can lead to breakthroughs in medicine and overall well-being."

Sam: "Hmm, I'm not sure what to think about microbial communities. On one hand, they can be beneficial, like helping plants grow better, but on the other hand, they can also be harmful, causing infections. It's a complicated subject, and I'm still hesitant to take a strong stance on it."

Emily: "Oh my gosh, I am so fascinated by microbial communities! It's like this hidden world of tiny creatures that have such a huge impact on everything. Just thinking about how they interact and evolve gives me goosebumps. I find it incredibly exciting, and it makes me appreciate the complexity and beauty of nature.

Ex. 10. Read the script of the lecture and summarize it

Ex. 11. Prepare a short talk on one of the following subjects

Personal topics:
1. My fascination with the microbial world and how it has shaped my career in microbiology.
2. Exploring the diversity of microbial communities in different environments and their impact on ecosystems.
3. The role of beneficial microbes in promoting human health and well-being.
4. My experience conducting research on the interactions between microbes and plants in agricultural systems.
5. How understanding microbial communities can lead to innovative solutions for environmental sustainability.

General topics:
1. Microbial communities play a crucial role in maintaining ecosystem balance. To what extent do you agree or disagree with this opinion?
2. The use of antibiotics has led to the emergence of antibiotic-resistant bacteria. Is this a positive or negative development?
3. Some people argue that the manipulation of microbial communities through probiotics and prebiotics can improve human health. Discuss both views and give your own opinion.
4. The discovery of new microbial species and their potential applications in various industries is an exciting development. To what extent do you agree or disagree with this statement?
5. Microbes have been used in bioremediation to clean up polluted environments. Is this a sustainable solution for addressing environmental contamination?

UNIT 15

How wireless energy from space could power everything

Ex. 1. Discuss the questions below

1. How important do you think energy is in our daily lives?
2. Have you ever thought about the possibility of wireless energy transfer? What are your thoughts on it?
3. Can you think of any advantages of collecting solar energy in space and sending it wirelessly to Earth?
4. Do you think wireless energy transfer could help solve energy problems in remote areas or during natural disasters? Why or why not?
5. If you had the opportunity to send energy wirelessly, where would you choose to send it and why?

Ex. 2. Match the words and expressions to their definitions

Definitions:

a. A device that receives and converts signals or information from a transmitter or another source.
b. Occurring or done in an instant; happening immediately.
c. A complete electronic circuit consisting of multiple interconnected components, typically etched onto a single chip of semiconductor material.
d. A small piece of semiconductor material containing electronic circuits, used in computers, smartphones, and other electronic devices.
e. The central point of focus or attention; the most important or prominent aspect.
f. To send or transfer energy from one place to another.
g. When two or more things happen at the same time or in a coordinated manner.
h. The disruption or obstruction of a signal caused by unwanted signals or noise.
i. Waves that consist of oscillating electric and magnetic fields and can travel through a vacuum, such as light or radio waves.
j. A mechanism or device that directs or concentrates something, such as light or sound, towards a specific point or area.
k. The process of transmitting electrical energy without the use of physical wires or cables.
l. The ability to connect devices to each other or to a network without the need for physical cables or wires.
m. The process by which gases or particles in the Earth's atmosphere absorb and reduce the intensity of electromagnetic radiation passing through it.
n. Radio frequency waves, which are a type of electromagnetic wave used for wireless communication and broadcasting.
o. A flat display panel that uses light-emitting diodes (LEDs) to produce images or illumination.
p. Power generation that can be controlled and adjusted according to demand, providing flexibility in electricity supply.

Words:

1. wireless connectivity
2. atmospheric absorption
3. transmit energy
4. focusing system
5. synchronized
6. electronic chip

7. receiver
8. focal point
9. interference
10. led panel
11. wireless energy transfer
12. integrated circuit
13. RF waves
14. instantaneous
15. dispatchable power
16. electromagnetic waves

Ex. 3 Listen to the lecture (file 15.1) and answer the questions

Questions:
1. How has data evolved over the last couple of decades?
2. Can we democratize access to energy in the same way we have with information?
3. What is the basis for wireless energy transfer?
4. How does interference affect the direction of energy waves?
5. How can timing be used to control the direction of energy waves?
6. What is the concept behind wireless energy transfer using synchronized antennas?
7. How can wireless energy transfer be used to power various devices?
8. How does the system track and send energy to different locations?
9. What are some potential applications of wireless energy transfer?
10. What challenges have prevented the implementation of space-based solar panels for wireless energy transfer?

Ex. 4 Discuss the questions

1. What are the main advantages of using solar power as a source of energy?
2. Can you explain how solar panels work to convert sunlight into electricity?
3. In your opinion, what are some potential challenges or limitations of widespread adoption of solar power?
4. How does solar power contribute to reducing greenhouse gas emissions and combating climate change?
5. Are there any innovative applications of solar power that you find particularly interesting or promising?
6. What factors should be considered when determining the feasibility of installing solar panels in a specific location?
7. Can you discuss any recent advancements or breakthroughs in solar power technology?
8. Do you think governments should provide more incentives for individuals and businesses to invest in solar power? Why or why not?
9. Are there any countries or regions that have successfully implemented large-scale solar power projects? If so, can you provide examples?
10. How do you see the future of solar power evolving in terms of efficiency, affordability, and accessibility?

Ex. 5 Fill in the gaps in the sentences, then translate the sentences into Russian

transmit, solar, instantaneous, constellation, focal, energy (2), absorption, green, interference, atmospheric, point, integrated, generator, panels, circuits

1. Discharge of collected water should be designed to minimise any _____(1) with natural beach processes.
2. The interstitial pressure at a point in the soil is an _____(2) variable that varies over time.
3. The earth revolves around the _____(3) _____(4) without changing its orientation in space.
4. Advancements in technology have provided some opportunity to use cost effective _____(5) _____(6) to improve radiosonde performance.
5. Atmospheric waves are important because they can _____(7) _____(8) and momentum without material transport of air parcels.
6. _____(9) _____(10) on the roofs of homes are a familiar sight in city and rural settings
7. A height of 60 feet with all this volume of water would generate enormous quantities of _____(11) _____(12)
8. _____(13) will produce electrical power from mechanical rotation of turbine.
9. Sound is attenuated by _____(14) _____(15) and by interaction with absorbing surfaces.
10. It is very important to the proper functioning of GPS that the precise configuration of the _____(16) be maintained.

Ex. 6 Listen to the recording (file 15.2) and translate the sentences into Russian

Ex. 7 Translate the sentences into English

1. Это оказывает воздействие на континентальные береговые линии, где вмешательство человека вносит значительный вклад в продолжающуюся эрозию.
2. Во второй колонке показаны мгновенные профили давления в моменты максимальных горизонтальных усилий.
3. В примере прогноза, который является центральной темой книги, он выбрал увеличение долготы.
4. Было обнаружено, что многие из коммерчески доступных интегральных схем передатчиков, используемых в индустрии беспроводных телекоммуникаций, не могут работать при чрезвычайно низкой температуре.
5. Волны передают энергию через среду.
6. Срок службы солнечной панели и контроллера заряда оказывает незначительное влияние на стоимость зарядки.
7. Существует множество потенциальных источников "зеленой" энергии, помимо ветра, солнца и ядерной энергетики.
8. Первоначальные испытания подтвердили, что генератор способен генерировать волны контролируемым образом.
9. Поскольку окружающий воздух циркулирует по всему этому объему, эффекты атмосферного поглощения между лампой и областью обнаружения сводятся на нет.
10. Данный подход может быть успешно адаптирован для других миссий группировки спутников LEO, при синергетическом использовании данных.

Ex. 8 Listen to the text (file 15.3) and choose the correct answers. Then read the text in the transcript section and translate it into Russian.

1. What are the two main types of solar energy systems mentioned in the text?
A. Solar thermal and wind
B. Photovoltaic and hydropower
C. Solar thermal and photovoltaic
D. Wind and hydropower

2. What is one advantage of solar energy mentioned in the text?
A. It produces greenhouse gas emissions.

B. It requires frequent maintenance.
C. It is an expensive solution.
D. It is a clean source of energy.

3. Where can solar energy systems be installed?
A. Only on rooftops
B. Only in open fields
C. Only in remote locations
D. On rooftops, in open fields, or integrated into buildings

4. How long can solar panels last with minimal maintenance?
A. Less than 10 years
B. Around 15 years
C. Around 25 years or more
D. More than 30 years

5. What is one challenge associated with solar energy mentioned in the text?
A. The high cost of installation
B. The constant source of power it provides
C. The need for frequent maintenance
D. The intermittent nature of sunlight

6. How can the challenge of intermittent sunlight be overcome?
A. By using energy storage technologies
B. By integrating solar energy with fossil fuels
C. By relying on wind energy instead
D. By increasing the number of solar panels

7. What is the potential role of solar energy mentioned in the conclusion?
A. Meeting a small portion of our energy needs
B. Reducing greenhouse gas emissions
C. Causing climate change
D. Ensuring an unsustainable future

Ex. 9 Discuss 4 opinions, which one do you agree with most and why

Adam: "I'm totally against solar energy, man. It's just a waste of time and money. My cousin installed solar panels on his roof, and they hardly generated any power. He ended up spending way more than he saved, and it was a nightmare to get them repaired when something went wrong."

Sarah: "Solar energy is the future, hands down. I mean, think about it, it's clean, sustainable, and doesn't harm the environment. My neighbor switched to solar energy, and now she barely pays anything in electricity bills. Plus, she feels good about reducing her carbon footprint."

Chris: "Ugh, I don't know what to think about solar energy, dude. On one hand, it's great for the environment, but on the other hand, it takes a lot of space to install those panels. I've seen some solar farms popping up near my hometown, and they're huge! I can't decide if it's worth sacrificing the landscape for renewable energy."

Emily: "OMG, I'm super passionate about solar energy! It's like a ray of hope in this dark world, you know? We need to shift towards cleaner sources like the sun, ASAP. My uncle installed solar

panels on his house, and he can power his entire home without relying on fossil fuels. It's amazing how solar energy can transform lives!"

Ex. 10. Read the script of the lecture and summarize it

Ex. 11. Prepare a short talk on one of the following subjects

Personal topics:
1. My experience installing solar panels on my home and the impact it has had on my energy consumption.
2. How I became passionate about solar power and started advocating for its use in my community.
3. The benefits of using solar power for heating and cooling my home.
4. My journey of starting a solar power business and helping others transition to clean energy.
5. The role of solar power in reducing my carbon footprint and contributing to a sustainable future.

General topics:
1. Solar power is the future of renewable energy. To what extent do you agree or disagree with this opinion?
2. Some people argue that investing in solar power is too expensive and not worth the cost. Is this a positive or negative development?
3. Solar power has the potential to revolutionize the way we generate electricity. Discuss the advantages and disadvantages of relying on solar energy.
4. The use of solar power has been steadily increasing, but there are still challenges to its widespread adoption. To what extent do you believe solar power can overcome these challenges?
5. Solar power has the ability to provide clean and sustainable energy for all. Discuss the social and environmental benefits of transitioning to solar power.

UNIT 16

What to do when there's a polar bear in your backyard

Ex. 1. Discuss the questions below
1. Have you ever seen a polar bear in real life? How did it make you feel?
2. How do you think climate change is affecting polar bears?
3. What are some challenges that people living in the Arctic face when coexisting with polar bears?
4. What are some ways that humans can help reduce negative encounters with polar bears?
5. How important do you think education is in promoting coexistence with wildlife?

Ex. 2. Match the words and expressions to their definitions

Definitions:
a. the measurement of how hot or cold the air is in a specific area
b. energy generated from renewable sources that do not produce harmful pollutants
c. large or giant animals that existed in prehistoric times or still exist today
d. the act of moving or transferring something or someone to a different place
e. the act of protecting and preserving something, such as natural resources or energy
f. a policy or practice that sets limits or restrictions on the amount or number of something
g. to confront or deal with a problem or challenge directly
h. an unpleasant or unfavorable meeting or interaction with someone or something
i. the customs, traditions, and way of life of native or original inhabitants of a region
j. the process of solid ice turning into liquid water due to an increase in temperature
k. an animal that primarily eats meat
l. to stop or catch something or someone before they reach their intended destination
m. to exist or live together peacefully despite differences or conflicts
n. the control, handling, and disposal of waste materials in an environmentally responsible manner
o. the destruction or disappearance of a natural environment where plants and animals live

Words:
1. tackle
2. melting ice
3. quota system
4. atmospheric temperature
5. conserving
6. indigenous culture
7. clean energy
8. intercept
9. habitat loss
10. megafauna
11. coexist
12. carnivore
13. negative encounter
14. relocation
15. waste management

Ex. 3 Listen to the lecture (file 16.1) and answer the questions

1. How are polar bears impacted by climate change?
2. What are some of the challenges of coexisting with polar bears?

3. Why do polar bears need sea ice?
4. What happens to polar bears when they lose their ice?
5. How do polar bears find food when they can't hunt seals?
6. Why is human food considered "junk food" for polar bears?
7. What are the safety concerns for humans living in polar bear habitats?
8. How does waste management play a role in polar bear coexistence?
9. What are some innovative technologies being developed to aid in polar bear coexistence?
10. What is the most important tool for coexisting with polar bears?

Ex. 4 Discuss the questions

1. What is global warming and how does it relate to the Arctic region?
2. How has global warming affected the Arctic ecosystem and its wildlife?
3. Can you explain the concept of melting ice caps in relation to global warming and the Arctic?
4. What are some specific consequences of global warming on indigenous communities living in the Arctic?
5. Are there any efforts being made to mitigate the effects of global warming in the Arctic? If so, what are they?
6. How do scientists study the impact of global warming on the Arctic?
7. What role does the Arctic play in regulating global climate patterns?
8. Can you discuss the potential economic implications of a melting Arctic due to global warming?
9. In your opinion, what can individuals do to contribute towards reducing global warming and protecting the Arctic?
10. How important is international cooperation in addressing the issue of global warming in the Arctic?

Ex. 5 Fill in the gaps in the sentences, then translate the sentences into Russian

intercepted, coexist, waste, energy, habitat, atmospheric, megafauna, harvested, innovative, clean, relocation

1. Two or more species that live in the same habitat and use the same resources can _____(1) without competing.
2. There may also be a considerable lag before _____(2) loss leads to species loss from the landscape.
3. For decades , _____(3) _____(4) technologies were too expensive to compete with fossil fuels.
4. The world once had many more large animals (_____(5)).
5. One way of reducing these costs is to increase the feedstock yields per acre that are _____(6)
6. Proper _____(7) management is possible in this system which results an extra source of income along with clean environment.
7. It places emphasis on sustainable and _____(8) technology in improving the local environment and integrates adaptation into national development planning.
8. Reserves and _____(9) help restore populations that contain several breeding pairs.
9. Some of the _____(10) moisture may be evaporated directly back into the atmosphere from the plant surface.
10. The lower _____(11) temperature could be simulated well by the model but with higher temperatures than observed.

Ex. 6 Listen to the recording (file 16.2) and translate the sentences into Russian

Ex. 7 Translate the sentences into English

1. Хищники могут определять количество видов добычи, которые могут сосуществовать в среде обитания.
2. Потеря девяноста процентов среды обитания приводит к вымиранию примерно 50 процентов видов, обитающих в этих местах.
3. Примерами экологически чистой энергии являются солнечная энергия, энергия ветра и гидроэлектростанция.
4. Тропическая мегафауна (например, киты , крокодилы , черепахи и акулы) серьезно истощена во всем мире.
5. Большая часть рыбы, которую употребляют в пищу люди, добывается в водах континентальных шельфов.
6. В 1980-х и 1990-х годах федеральные нормативные акты и постановления штатов поставили обращение с промышленными отходами под строгий контроль.
7. Была создана база данных для записи информации, относящейся к инновационным технологиям, процедурам или методам, полученным в ходе исследовательского процесса.
8. Тип окаменелости очень важен, потому что не все окаменелости дают точную информацию об уровне моря в прошлом.
9. Растения также влияют на атмосферу, затеняя землю под ними и препятствуя выпадению осадков.
10. По прогнозам, глобальная температура поверхности моря будет повышаться медленнее, чем температура атмосферы.

Ex. 8 Listen to the text (file 16.3) and choose the correct answers. Then read the text in the transcript section and translate it into Russian.

1. What is one of the most visible impacts of global warming on the Arctic?
A. Increased competition among Arctic nations
B. Thawing permafrost
C. Decline in sea ice extent
D. Melting of Arctic ice threatens iconic species

2. How does the loss of sea ice contribute to global warming?
A. It reflects sunlight back into space, cooling the planet.
B. It absorbs more of the sun's energy, warming the atmosphere.
C. It releases large amounts of carbon dioxide and methane.
D. It poses risks to infrastructure built on frozen ground.

3. Which statement about the Arctic's changing environment is NOT true?
A. The melting of Arctic ice threatens the survival of polar bears and walruses.
B. Thawing permafrost releases potent greenhouse gases.
C. The Arctic's frozen landscapes are not affected by climate change.
D. Infrastructure built on frozen ground is at risk due to thawing permafrost.

4. What opportunities are revealed as the Arctic melts?
A. Increased competition among Arctic nations
B. Disruption of ecosystems and displacement of communities
C. Opening up of new shipping routes and access to resources
D. Investment in Arctic infrastructure and military capabilities

5. Which country has been investing heavily in its Arctic infrastructure and military capabilities?
A. Russia
B. United States
C. China
D. Canada

6. What determines the future of the Arctic and its role in the global climate system?
A. Increased competition among Arctic nations
B. Disruption of ecosystems and displacement of communities
C. Opening up of new shipping routes and access to resources
D. Management of competing interests

7. How does the opening up of new shipping routes benefit international trade?
A. It reduces travel times between Europe, Asia, and North America.
B. It stimulates economic growth and trade.
C. It disrupts ecosystems and displaces communities.
D. It threatens the survival of iconic species.

Ex. 9 Discuss 4 opinions, which one do you agree with most and why

Sam: "I think global warming is a serious problem that needs immediate attention. Last year, I witnessed the polar ice caps melting during my trip to Iceland. It was really heartbreaking to see such a beautiful place being destroyed by rising temperatures."

Emma: "Honestly, I'm still on the fence about global warming. On one hand, I've seen the effects like extreme weather conditions and shorter winters. But on the other hand, I've also read articles arguing that climate change has always been a natural occurrence. So, I have mixed feelings."

Alex: "I'm totally against the idea that humans are causing global warming. Sure, the planet is getting warmer, but it's a natural cycle. Look at history – there were periods much hotter than now, and no cars or factories causing it. People are exaggerating the problem!"

Sophie: "Global warming terrifies me! I've seen videos of entire coastal towns being swallowed by the sea due to rising water levels. The thought of losing our homes and destroying the ecosystems that sustain life on this planet is just too much to bear. We need to act now before it's too late!

Ex. 10. Read the script of the lecture and summarize it

Ex. 11. Prepare a short talk on one of the following subjects

Personal topics:
1. How my personal actions have contributed to combating global warming.
2. The impact of global warming on my local community and what we can do to mitigate it.
3. My experience volunteering for an organization focused on addressing the effects of global warming.
4. The role of renewable energy in reducing global warming and how it has influenced my perspective on sustainability.
5. The importance of individual responsibility in addressing global warming and steps I have taken to reduce my carbon footprint.

General topics:
1. Global warming is a result of human activities. To what extent do you agree or disagree with this opinion?
2. Some people argue that global warming is a natural phenomenon and not caused by human actions. Discuss both views and give your own opinion.
3. The effects of global warming are irreversible. Is this a positive or negative development?
4. The government should implement stricter regulations to combat global warming. To what extent do you agree or disagree with this opinion?
5. Global warming is a global problem that requires international cooperation. Discuss the challenges and benefits of global collaboration in addressing this issue.

App. 1

GLOSSARY

UNIT	TERM	DEFINITION	TRANSLATION
13	absorb	take in or soak up (energy or a liquid or other substance) by chemical or physical action	поглощать
14	adaptable	able to adjust to new conditions	легко приспособляющийся
11	aerial	existing, happening, or operating in the air	воздушный
11	air vent	an opening that allows air to pass out of or into a confined space	воздухоподводящее отверстие
14	antibiotic resistance	occurs when bacteria change in response to the use of these medicines	устойчивость к антибиотикам
11	aquifer	a body of permeable rock which can contain or transmit groundwater	водоносный горизонт
15	atmospheric absorption	the process by which the Earth's atmosphere absorbs certain wavelengths of electromagnetic radiation	атмосферное поглощение
16	atmospheric temperature	a measure of temperature at different levels of the Earth's atmosphere	температура воздуха
13	back on track	following a course that is likely to achieve what is required	в нужное русло
14	bacterial mat	a multi-layered sheet of microorganisms, mainly bacteria and archaea, or bacteria alone	бактериальный мат
9	below-replacement fertility	total fertility levels below 2.1 children per woman	рождаемость ниже уровня воспроизводства населения

11	biodiversity	the variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable	биологическое разнообразие
14	biofilm	a thin but robust layer of mucilage adhering to a solid surface and containing a community of bacteria and other microorganisms	биопленка
12	biological activity	the ability of a particular molecular entity to bring about a specific biological change on the target whose biological effect is to be effected	биологическая активность
12	boost	help or encourage (something) to increase or improve	стимулировать, повысить
12	break down	convert a substance into simpler compounds by chemical action	расщеплять (какое-либо вещество)
14	breathable oxygen	one that is suitable for humans to breathe	пригодный для дыхания кислород
12	budding	(of a plant) having or developing buds	распускающийся
12	carbon dioxide	a colourless, odourless gas produced by burning carbon and organic compounds and by respiration. It is naturally present in air (about 0.03 per cent) and is absorbed by plants in photosynthesis	углекислый газ (CO2)
10	carbon emissions	he release of carbon compounds such as carbon dioxide (CO2) and methane (CH4) into the atmosphere	углеродные выбросы

11	carbon impact	amount of carbon dioxide emissions associated with all the activities of a person or other entity	углеродное воздействие
13	carbon pollution	Carbon dioxide emissions or CO2 emissions are emissions stemming from the burning of fossil fuels and the manufacture of cement	углкродное загрязнение
13	carbon storage	the process of trapping carbon dioxide produced by burning fossil fuels or other chemical or biological processes and storing it in such a way that it is unable to affect the atmosphere, with the aim of mitigating the effects of global warming.	хранение углерода
12	carbon-sequestering	a natural or artificial process by which carbon dioxide is removed from the atmosphere and held in solid or liquid form	поглощение углерода
9	caregiver	family member or paid helper who regularly looks after a child or a sick, elderly, or disabled person	лицо, осуществляющее уход или лечение
16	carnivore	an animal that feeds on other animals	хищник
14	chemical cycle	Chemical cycling describes systems of repeated circulation of chemicals between other compounds, states and materials	химический цикл
16	clean energy	energy that comes from renewable, zero emission sources that do not pollute the atmosphere when used	чистая энергия

12	climate mitigation	avoiding and reducing emissions of heat-trapping greenhouse gases into the atmosphere to prevent the planet from warming to more extreme temperatures	смягчение последствий изменения климата
12	climate-adapted crops	the ability of a crop (or variety) to respond positively to changes in agricultural conditions	культуры, приспособленные к местному климату
16	coexist	exist at the same time or in the same place	сосуществовать
14	complex chemicals	Examples of complex chemical compounds are: Proteins. Nucleic Acids (DNA, RNA) Polysaccharides (Starch, Cellulose)	сложные химические вещества
13	conserved area	an area of land that is protected and that cannot be built on or used for certain purposes	заповедная зона
16	conserving	protect (something, especially something of environmental or cultural importance) from harm or destruction	сохранение
15	constellation	a group of associated or similar people or things	группировка (спутников)
13	coral reef	a ridge of rock in the sea formed by the growth and deposit of coral	коралловый риф
10	cotton	a soft white fibrous substance which surrounds the seeds of the cotton plant and is made into textile fibre and thread for sewing	хлопчатобумажная ткань или пряжа
12	critter	a living creature; an animal	существо
14	cutting-edge technique	the most advanced that there are in a particular field	передовая техника

14	cyanobacteria	a division of microorganisms that are related to the bacteria but are capable of photosynthesis. They are prokaryotic and represent the earliest known form of life on the earth	цианобактерия
14	dead plant material	Plant litter (also leaf litter, tree litter, soil litter, litterfall or duff) is dead plant material (such as leaves, bark, needles, twigs, and cladodes) that have fallen to the ground	мертвый растительный материал
12	decompose	make or become rotten; decay or cause to decay	разлагать(ся)
12	decompression	reduction in air pressure	сброс давления; снижение давления
9	demographic dividend	economic growth brought on by a change in the structure of a country's population	демографический дивиденд
9	demography	the composition of a particular human population	демография
9	depopulation	substantial reduction in the population of an area	депопуляция
10	devastating	highly destructive or damaging.	опустошительный; разрушительный
15	dish antenna	dish-shaped, usually concave parabolic, reflector, used to transmit or receive radio and TV signals	спутниковая антенна
15	dispatchable power	Dispatchable fuel resources include nuclear, coal, and natural gas	требуемая мощность
10	disposability	the fact that something is intended to be thrown away after use or after a short time.	утилизация

13	domesticated livestock	the domesticated animals raised in an agricultural setting in order to provide labour and produce diversified products for consumption	домашний скот
14	drought	a prolonged period of abnormally low rainfall, leading to a shortage of water	засуха
15	electromagnetic waves	waves that are created as a result of vibrations between an electric field and a magnetic field	электромагнитные волны
15	electronic chip	a chip is comprised of semiconductor material cut from a larger wafer of material that is only a few millimeters on one side	электронный чип; чип с электронной микросхемой
11	ember	a small piece of burning or glowing coal or wood in a dying fire	последние тлеющие красные угольки
10	embody	include or contain (something) as a constituent part	воплощать; претворять в жизнь
11	entrepreneurship	the activity of setting up a business or businesses, taking on financial risks in the hope of profit	предпринимательство
14	environmental cause	the sum total of all the conditions and elements that make up the surroundings and influence the development of an individual	экологическая причина
14	existential threat	a threat to something's very existence	экзистенциальная угроза

11	exterior boundary	he perimeter of any lot or parcel of land or assembly of lots or par- cels to be developed in an integrated, comprehen- sive manner	внешняя граница
15	far-fetched	unlikely and unconvincing; implausible	надуманный
10	fast fashion	inexpensive clothing produced rapidly by mass-market retailers in response to the latest trends	быстрая мода
12	fertility	the quality of being fertile; productiveness	плодородие
11	fire management	the process of planning, preventing and fighting fires to protect people, property and the forest resource	профилактика лесных пожаров и борьба с ними
11	fire-adapted	communities take mitigation actions so they can live with wildfire without harm and without extensive wildfire suppression efforts	огнестойкий
11	firefighting	the action or process of extinguishing fires, as a person's job	тушение пожара
11	fire-resistant material	one which is designed to resist burning and withstand heat	огнеупорный материал
15	flexible electronics	a class of electronic devices built on conformable or stretchable substrates, usually plastic, but also metal foil, paper and flex glass	гибкая электроника
16	floating away	be carried away (on water or on the air.)	уплывать

15	focal point	the point at which rays or waves meet after reflection or refraction, or the point from which diverging rays or waves appear to proceed	фокальная точка
15	focusing system	etting a lens appropriate to the distance of the subject so as to have a sharp picture	система фокусировки
14	food insecurity	the condition of not having access to sufficient food, or food of an adequate quality, to meet one's basic needs	отсутствие продовольственной безопасности
11	forest conservation	Forest conservation is the practice of planning and maintaining forested areas for the benefit and sustainability of future generations	охрана леса; рациональное лесопользование
10	forgettable item	Anything that's not memorable, especially because it's just not very interesting	ненужные, забывающиеся
14	fossil carbon source	burning of fossil fuels like gas, coal and oil, deforestation and volcanic eruptions	ископаемые источники углерода
12,14	fungi	any of a group of spore-producing organisms feeding on organic matter, including moulds, yeast, mushrooms, and toadstools	грибы
10	garment worker	a person whose occupation is making and altering garments	работник швейной промышленности
15	generator	a dynamo or similar machine for converting mechanical energy into electricity	генератор

14	genome	the haploid set of chromosomes in a gamete or microorganism, or in each cell of a multicellular organism	геном
10	global North	the nations of the world which are characterized by a high level of economic and industrial development, and are typically located to the north of less industrialized nations	Глобальный Север (развитые страны)
13	grassland	a large open area of country covered with grass, especially one used for grazing	луг, пастбище
15	green energy	any energy type that is generated from natural resources, such as sunlight, wind or water	зеленая энергетика
14	greenhouse gases	a gas that contributes to the greenhouse effect by absorbing infrared radiation. Carbon dioxide and chlorofluorocarbons are examples of greenhouse gases.	парниковые газы
11	ground-based	located on the ground as opposed to in an aircraft or in space	наземный
9	growth rate	the percent change of a variable over time	темпы развития; темпы роста
16	habitat loss	the process by which a natural habitat becomes incapable of supporting its native species	потеря среды обитания
14	hand sanitizer	a liquid or gel, typically one containing alcohol, that is used to clean the hands and kill bacteria, viruses, and other disease-causing agents on the skin	дезинфицирующее средство для рук
16	harvest	the process or period of gathering in crops	уборка урожая

9	hit record lows	the lowest amount or level that something has ever reached	достичь рекордно низкого уровня
14	human cells	the basic building blocks of all living things	клетки человека
9	human population	the whole number of inhabitants occupying an area (such as a country or the world)	народонаселение
16	hurdle	a problem or difficulty that must be overcome	препятствие
16	ice-free season	when the sea ice area drops below 1 million sq. km	период, когда море свободно ото льда
11	immediate proximity	two or more objects or locations that are in close physical proximity to each other	непосредственная близость
12	immune system	the organs and processes of the body that provide resistance to infection and toxins	имунная система
16	Indigenous culture	native societies of various regions in the world that existed before colonization occurred	культура коренных народов
13	Indigenous people	Indigenous peoples are the earliest known inhabitants of an area and their descendants	коренные народы
13	industrialization	the development of industries in a country or region on a wide scale	индустриализация
16	innovative technology	a new or improved product or process whose technological characteristics are significantly different from before	прогрессивная технология
15	instantaneous	occurring or done instantly	мгновенный

15	integrated circuit	an electronic circuit formed on a small piece of semiconducting material, which performs the same function as a larger circuit made from discrete components	интегральная микросхема
15	integrated electronics	a set of electronic circuits on one small flat piece of semiconductor material, usually silicon	встроенная электроника
16	intercept	obstruct (someone or something) so as to prevent them from continuing to a destination	перехватывать
15	interference	the combination of two or more electromagnetic waveforms to form a resultant wave in which the displacement is either reinforced or cancelled	помехи
11	interior area	the region that is inside of something	внутренняя зона
9	labor cost	all the expenses incurred by employers in employing workers	издержки на оплату рабочей силы
15	LED panel	flat panel display that uses an array of light-emitting diodes as pixels for a video display	светодиодная панель
10	legislation	the process of making or enacting laws	законодательство
13	local community	a group of interacting people living in a common location	местное сообщество
10	longevity	long existence or service	долговечность
9	low fertility	when a population has a low level of offspring, or when a small number of babies are being born when compared to the population	низкая рождаемость

11	low-intensity	any form of physical activity or exercise performed at a steady state requiring roughly 50% of your maximum heart rate with no rest periods in between	малоинтенсивный
15	magnifying glass	a lens that produces an enlarged image, typically set in a frame with a handle and used to examine small or finely detailed things such as fingerprints and fine print	увеличительное стекло
13	marine environment	those in the World's Seas and Oceans below mean high tide mark	морская окружающая среда
13	marine life	made up of the plants, animals and other organisms that live in the salty water of the seas and oceans of Earth	фауна и флора океана
13	marine reserve	marine protected area in which removing or destroying natural or cultural resources	морской заповедник
10	massive	large and heavy or solid	массивный; тяжёлый
15	mechanical movement	the change in position of a body relative to other bodies	механическое движение
13	Mediterranean	of or characteristic of the Mediterranean Sea, the countries bordering it, or their inhabitants	средиземноморский
16	megafauna	the large mammals of a particular region, habitat, or geological period	мегафауна
11	megafire	wildfire that burns more than 40,500 hectares (100,000 acres) of land	сильный лесной пожар на площади более 100000 акров
16	melting ice	When heat (a form of energy) is added, the ice melts into liquid water	таяние льдов

14	microbial decomposition	the process or act of breaking down an organic material or substance into smaller constituent parts, especially by the action of decomposers	микробное разложение
14	microbial disease	when the infection causes damage to the individual's vital functions or systems	микробное заболевание
14	microbial diversity	the range of different kinds of unicellular organisms, bacteria, archaea, protists, and fungi	микробное разнообразие
12	microbial life	very small living things, especially ones that cause disease	микробная жизнь
14	microbiome	the microorganisms in a particular environment (including the body or a part of the body)	микробиом
9	military spending	the amount of financial resources dedicated by a nation to raising and maintaining an armed forces	затраты на оборону
13	mitigate climate change	reducing the flow of heat-trapping greenhouse gases into the atmosphere	смягчение последствий изменения климата
12	multitude	a large number of people or things	множество
9	mutual benefit	a contract or agreement in which both parties gain some type of advantage or value	взаимная выгода
13	national park	an area of countryside, or occasionally sea or fresh water, protected by the state for the enjoyment of the general public or the preservation of wildlife	государственный заповедник

11	natural system	An open system whose elements, boundary, and relationships exist independently of human control	естественная экосистема; природная экосистема
16	negative encounter	experience that is negative is unpleasant, depressing, or harmful	негативный опыт
13	no-take area	a highly protected type of MPA where removing or destroying natural or cultural resources is prohibited	закрытые охраняемые районы
14	nutrient	a substance that provides nourishment essential for the maintenance of life and for growth	питательное вещество
9	old-age poverty	Percentage with income lower than 50% of median equivalised household disposable income. Older people (aged over 65)	бедность среди пожилых людей
14	ooze out	to flow slowly out of something through a small opening, or to slowly produce a thick sticky liquid	просачиваться наружу
12	organic matter	matter that has come from a recently living organism	органическое вещество
10	overconsumption	the action or fact of consuming something to excess	избыточное потребление
11	overgrown	covered with plants that have been allowed to grow wild	растущий без ухода (о растениях)
9	overload	an excessive amount of something	перегрузка (загрузка сверх нормы)
10	passing trend	something that is popular for a short time but quickly goes out of style	мимолетная тенденция.
14	pathogenic	(of a bacterium, virus, or other microorganism) causing disease	болезнетворный

9	pay-as-you-go	a system of meeting costs as they arise or paying for a service before it is used	оплата по факту оказания услуги / получения продукта
12	photosynthesis	the process by which green plants and some other organisms use sunlight to synthesize nutrients from carbon dioxide and water. Photosynthesis in plants generally involves the green pigment chlorophyll and generates oxygen as a by-product	фотосинтез
15	photovoltaics	the branch of technology concerned with the production of electric current at the junction of two substances	фотогальваника
14	planetary health	the health of human civilization and the natural systems on which it depends	планетарное здоровье
9	population aging	an increasing median age in a population because of declining fertility rates and rising life expectancy	старение населения
9	population growth	the increase in the number of people in a population or dispersed group	прирост населения
9	population size	the total number of organismns in a given area	численность населения
9	populous	having a large population; densely populated	густонаселённый
15	power transmission	the movement of energy from its place of generation to a location where it is applied to perform useful work	передача энергии

9	preordained	(of an outcome or course of action) decided or determined beforehand; predestined	предопределенный
13	pristine	in its original condition; unspoilt	нетронутый
10	quick fix	an easy remedy or solution, especially a temporary one which fails to address underlying problems	решение проблемы на скорую руку
16	quota system	a system that limits the number of immigrants who may officially enter a country each year, or that states how many should be allowed to enter	система квотирования
12	rebuilding soil	the process of rehabilitating and improving soil structure, fertility, productivity, organic content, and overall quality	повышение органического вещества в почве
15	receiver	the part of a telephone apparatus contained in the earpiece, in which electrical signals are converted into sounds	приёмник (сигнала)
9	recruiting pool	the total number of applicants you receive for each job post	вербовочная база (круг лиц для подбора кандидатов на вербовку
11	rejuvenate	restore (a river or stream) to a condition characteristic of a younger landscape	восстанавливать
16	relocation	the action of moving to a new place and establishing one's home or business there	смена места расположения
11	remote community	geographical area where a community is located over 350 km from the nearest service centre having year-round road access	удалённый населённый пункт

9	resilient	capable of withstanding shock without permanent deformation or rupture	стойкий, устойчивый
11	resilient landscape	successfully coping with and managing the impacts of climate change while preventing those impacts from growing worse	устойчивый ландшафт
10	revolutionizing	change (something) radically or fundamentally.	произвести революцию
10	rewear	to wear again	одежда из вторсырья
13	rewild	restore (an area of land) to its natural uncultivated state (used especially with reference to the reintroduction of species of wild animal that have been driven out or exterminated)	восстановить
15	RF waves	the oscillation rate of an alternating electric current or voltage or of a magnetic, electric or electromagnetic field or mechanical system in the frequency range from around 20 kHz to around 300 GHz	радиочастотные волны
12	rock weathering	the breaking down or dissolving of rocks and minerals on the surface of the Earth	выветривание пород
13	seaweed forests	are underwater areas with a high density of kelp	заросли водорослей
12	seed disperser	the mechanism by which plant seeds are transported to new sites for germination and the establishment of new individuals	диспергатор семян

16	self-proclaimed	described as or proclaimed to be such by oneself, without endorsement by others	самопровозглашённый
13	short-term profit	profits a company makes from the sale of an asset that it's had for one year or less	сиюминутная выгода
9	shrink	become or make smaller in size or amount	сократиться
12	sneak peek	an opportunity to see or experience something before it is officially presented or released to the public	взгляд украдкой
12	soil aggregate	Arrangement of primary soil particles (sand, silt, clay) around soil organic matter and through particle associations	почвенный агрегат
12	soil clump	a solid mass of something such as soil	комья почвы
12	soil microbe	a group of microscopic life forms that include bacteria, archaea, viruses, and eukaryotes like fungi	почвенный микроорганизм
12, 14	soil particle	the particles which constitute the inorganic portion of soil and which are 2 mm or less in diameter	почвенная частица
15	solar panel	a panel designed to absorb the sun's rays as a source of energy for generating electricity or heating	солнечная панель
11	space-based	based in space (especially in orbit, but sometimes on a planet or moon)	космический
16	starving	suffering or dying from hunger	голодание
9	status quo	the existing state of affairs, especially regarding social or political issues	статус кво

13	subsidize	support (an organization or activity) financially	субсидировать
10	sustainable fashion	refers to clothing that is designed, manufactured, distributed, and used in ways that are environmentally friendly	устойчивая мода
15	synchronized	happen at the same time	синхронизированный
16	tackle climate change	reducing the flow of heat-trapping greenhouse gases into the atmosphere	борьба с изменением климата
10	tailoring industry	a system where the garment is made for a particular person according to the body measurement of the person	швейная промышленность
9	tectonic forces	he energy or the movements that cause a change in the Earth's crust	тектонические силы
12	terrestrial biome	the ecosystems found in a similar climatic pattern in a region that need not be located in proximity but span across the earth	наземный биом
10	throw away	discard something as useless or unwanted	выбрасывать
9	total growth	the percentage increase in Earnings Per Share for threshold, target	общий прирост
9	total population	the total number of people in that area at a given time	общая численность населения
9	trade-off	a balance achieved between two desirable but incompatible features; a compromise	компромисс
15	transmit energy	Energy transmission is the most basic function of global energy interconnection	передавать энергию

11	tribal community	Tribal community means any community which is living outside a tribal territory but is organized in a tribal manner	родовая община
12	tropical rainforest	a hot, humid, and flourishing dense forest, usually found around the equator	тропический лес
12	underappreciated	not valued or appreciated highly enough	не получивший достаточного признания
13	underwater desert	areas of the ocean that do not receive enough ocean	подводная пустыня
12	undisturbed	not disturbed : not altered or interfered with	ненарушенный
10	unshakable	it is firm and cannot be made weaker or destroyed	непоколебимый
10	unsustainable	not able to be maintained at the current rate or level	неэкологичный
11	utility line	a pipe, conduit, cable, or other facility by which services are conveyed to the public	линия энергоснабжения
11	vegetation	plants considered collectively, especially those found in a particular area or habitat	растительность
14	viral pandemic	an epidemic of an infectious disease that has spread across a large region, for instance multiple continents or worldwide	вирусная пандемия
16	waste management	he various schemes to manage and dispose of wastes	обработка отходов
11	wicked	evil or morally wrong	безнравственный
11	wildfire	a large, destructive fire that spreads quickly over woodland or brush	лесной пожар

15	wireless connectivity	the ability of a computing device to connect to other computers or to the internet	беспроводная связь
15	wireless energy transfer	a number of different technologies for transmitting energy by means of electromagnetic fields	беспроводная передача энергии

App. 2

TRANSCRIPTS

UNIT 9

Recording 9.1

THE TRUTH ABOUT HUMAN POPULATION DECLINE

https://www.ted.com/talks/jennifer_d_sciubba_the_truth_about_human_population_decline

Astronomers tell us that when we look to the night sky, we're actually looking back in time. Light from those faraway stars takes so long to reach our eyes here on Earth, that by the time we wish upon a particular star, it may no longer even exist.

I'm here to tell you the population of Earth is a lot like those stars. In parts of the globe, the human population is already, or will soon be, shrinking. I know what you're thinking. And yes, total population is still growing from eight billion today to a peak of probably nine or 10 billion. But when we track total increase, we're looking at the star that seems to be shining brightly, but in actuality has already imploded.

And that's because there's a difference between what's happening on the surface -- which is obvious total growth -- and the tectonic forces beneath. Since the 1960s, world population has more than doubled, but the growth rate has been falling the entire time. We're witnessing the most fundamental shift to take place in modern human history. The shift towards pervasive and permanent low fertility, population aging and eventual depopulation.

Fertility is down everywhere, just at different rates in different places. If fertility stays the same as it is today, just hold still, by the end of this century, China's population will be less than half of its current size. It's a loss of 800 million people. South Korea's will be down by 63 percent, Poland's and Japan's by half, Italy's and Thailand's by 44 percent, Eastern Europe by 40 percent.

Even greater number of countries are already aging. Again, just 20 years ago, if we'd lined up everyone in Japan or Italy or Germany from the youngest person to the oldest and we ask that person in the middle their age, they would have been 40 years old. Today, the populations of Thailand, Kuwait and Cuba are just as old, with Chile, Iran and Vietnam close behind. And even India, as it seems to be this bright star, assuming the throne as world's most populous country, has below-replacement fertility. The number of young people entering into India's workforce has already peaked.

People are the foundation of everything in a society. We're the workers and the voters and the soldiers and the caregivers. So how many of us there are and who we are, that matters. We're on track for there to be more people over age 60 than under the age of 14 by the middle of this century. That radical shift in modern human society presents us with a world of possibilities. Our demography is our destiny, yes, but how we react to that demography is not preordained. What possible worlds might we create if we thoughtfully plan for an older, smaller population?

In one possible world, we put our heads in the sand and keep going about our business as usual. We have seen most societies react like they're living in this world and throw money at people to have more babies. But it doesn't work. South Korea has spent 210 billion dollars over the last 16 years trying to raise fertility and they keep hitting record lows, under one child per woman on average.

In this status quo world, we keep the same economic models that assume infinite population growth and amass more debt to pay for our public spending. Our social safety nets stay the same, which, those rely on more inputs from workers than withdrawals from retirees. That's what we call a pay-as-

you-go system. Western Europe is already struggling to keep these systems afloat because in many of those countries there are only two workers for every retiree. You can see how top heavy the population's age structure is here and how in the next few years it will grow even more so that way.
In a status quo world, the world's most powerful countries continue to increase military spending and try to project power beyond their borders, even as their national budgets strain and the recruiting pool for soldiers shrinks. Hello, Russia, China, and maybe even the United States.
So what results from failing to adapt and clinging to the status quo? Systems overload and break. We have higher labor costs which lead to inflation and that just makes it even more expensive to have children. Social security systems go bankrupt and we lose the gains we've made in reducing old-age poverty.
But a head in the sand world isn't as bad as a fearful one. In a fearful world, the ability to choose how many children to have and when to have them gets taken away. Something that's easier in less democratic settings. And not good news here either. Twenty years ago, almost all of our aging countries were democracies. Now, a quarter of them, those with median ages of 35 or higher, aren't free. And I know we see this idea of coercion in science fiction, but it's not just science fiction. In 1965, when Nicolae Ceaușescu took the helm in Romania and he wanted more Romanian babies, he forced it to happen through invasive measures. Fertility temporarily spiked, but not without dire consequences for women and for those children, many of whom were abandoned to orphanages.
In a fearful world, immigration becomes more restricted. There's more hatred and division as majority groups fear being replaced by people who don't look like them. There’s less global cooperation as aging, shrinking countries, they lose the willingness and ability to think about causes outside their borders and fund those. We can't come together on pandemics or climate change or other transboundary issues. Does any of this sound familiar?
I actually don't think we're fully in this world yet, even if way too much of this hits close to home. But I can imagine how we might get there if we aren't proactive to shape the world we want. And what kind of world would we want?
Well, in a resilient world, we compete to attract talent from across the globe and set aside our nationalist tendencies. A shrinking world is in our future, but obviously some places are much closer than others. In the Democratic Republic of the Congo, Ethiopia, Nigeria, Tanzania, fertility is still high enough that each generation is twice the size of the one before it. Those young and growing populations can be a tremendous resource for their national economies if we have investments in human capital and other policies that can help these countries reap a demographic dividend. And they can be a resource for the global economy too. I mean, the US and Canada, they stand out as still growing despite below replacement fertility in both. And in fact, Canada had record population growth last year, 96 percent of which was due to immigration. Theirs aren't the only models for immigration and there are obvious trade-offs to opening your borders. But no one said this would be easy.
And speaking of things not being easy, we're going to have to work longer. Me too. You too. And that's because in nearly half of economies that the OECD tracks, fewer than 10 percent of people over the age of 65 still work. That is not going to fly in a resilient world. But in a resilient world, we've rethought what work looks like at older ages, and we strategically leverage technology to maximize our productivity. And we can work longer because we're healthier.
In a resilient world, we finally realize that investing in health is a much better use of time and resources than trying to dictate population size. Similarly, in a resilient world, we've put in place policies, incentives and technologies that recognize how we consume is just as important as how many of us consume. And the environment is healing.
In a resilient world, those societies closer to the start of this demographic transition take advantage of the time to plan and institute sustainable systems in the face of their demographic change. This is important because for the population ages 60 plus to go from 15 percent of the total to 30 percent, it'll take Ireland 92 years, the United Kingdom 89 years, and Germany 70 years. For that same demographic shift to happen now, it'll take India 34 years, Mexico 32, Iran 20 and Thailand, only 19. It's happening faster now. And we really need to realize this because those countries have to act,

including suites of policies like moving away from informal economies that increase the risk of poverty in older ages.
You know, there are so many people on the planet right now just between the ages of 65 and 74, that altogether they'd be the third most-populous country in the world. There's far more of them than there are global migrants, which we don't hear about, right? And there'll be 800 million of them by the middle of this century. They're a vast untapped resource in most places in the world right now, but a well-utilized one in a resilient world and to mutual benefit.
We should run from a fearful world and get our heads out of the sand. And we should be able to imagine a much better, more resilient world. I've always thought that the way we feel about population aging to a large extent reflects the really negative way we feel about our individual aging. And that bias has held us back. But just as with our own aging, this shift is inevitable. So what are we going to do about it?
As individuals, we know that our actions now set us up to live longer, healthier, more financially secure lives. Our society's actions set us up for one of these three worlds to become our reality. Let's make it a resilient world and reimagine a grayer, smaller world as a beautiful one.

Recording 9.3

Population decline is a growing concern in many countries around the world. It refers to a decrease in the number of people living in a particular area over time. This decline can occur due to various factors such as low birth rates, aging populations, emigration, and urbanization.
One of the main causes of population decline is a decrease in birth rates. In developed countries, people are having fewer children compared to previous generations. This can be attributed to various reasons such as changing social norms, increased access to contraception, and the desire for smaller families. As a result, the younger population is not replacing the older generation at a sustainable rate, leading to a decline in overall population numbers.
Another contributing factor to population decline is an aging population. Advances in healthcare and improved living conditions have led to increased life expectancy. While this is a positive development, it also means that there are more elderly people in society who require care and support. With a smaller working-age population to provide for them, this can put a strain on social welfare systems and healthcare services.
Emigration is another factor that can contribute to population decline. Many individuals choose to leave their home countries in search of better opportunities elsewhere. This brain drain can lead to a loss of skilled workers and professionals, which can have a negative impact on the economy and society as a whole.
Urbanization is also playing a role in population decline. As more people move from rural areas to cities in search of employment and a higher standard of living, rural communities are left with dwindling populations. This can have significant implications for local economies, infrastructure, and social cohesion.
Population decline poses several challenges for governments and policymakers. They need to find ways to encourage higher birth rates, attract skilled immigrants, and create policies that support the needs of an aging population. Additionally, efforts should be made to revitalize rural areas and promote balanced regional development.
In conclusion, population decline is a complex issue affecting many countries. It is essential for governments to address this challenge by implementing effective policies that promote sustainable population growth and ensure the well-being of their citizens.

UNIT 10

Recording 10.1

THE SIMPLE SOLUTION TO FAST FASHION

https://www.ted.com/talks/josephine_philips_the_simple_solution_to_fast_fashion

I'd like to take you all back to the late 1950s in Sierra Leone. My 93-year-old grandmother is about my age. She lives in Freetown. It is hot and she is beautiful. She goes to a market one day and she buys a yellow dress. It has stripes down it and an orange tie attached to the collar. It is also beautiful. My grandmother Isa is married to my grandfather, Harry, and this dress is the favorite of all her dresses because it's shorter than the rest, meaning he gets to see more of her legs.
She wears it a lot for herself and for him, and she brings it with her in the 1960s when she comes to England.
Flash forward six decades and I'm sitting with her in her room in the summer of 2018 and she gives this dress to me, entrusting me with its 60-year-long story. And in doing so, she teaches me an unshakable lesson about what it means to truly value what we own.
That lesson meant everything to me. It meant everything when I went to work at a second-hand clothes tech company and it meant everything when I left to start my own startup, SOJO, a fashion-tech solution that's revolutionizing the clothing repair and tailoring industry. And it continues to mean everything here today.
Valuing clothes that we own is not the cultural norm. I've grown up as part of the fast fashion generation, which is all about overconsumption and hyper disposability of clothing, meaning we buy way too much and we throw it away without a second thought.
Think, "Oh, I've worn that top on Instagram, so I don't want to wear it again." Or, "This shirt has ripped, so I'm going to chuck it and get a new one." Or, "I've got a date lined up on Friday, so I'm going to buy a new outfit." This is how we've been taught to engage with our clothes. This is how I used to think.
But engaging with clothing in this way has an absolutely devastating cost, a side we in the global North so rarely get to see. That top from that Instagram post that went to a charity shop instead of being reworn, it could have ended up as one of 15 million items arriving to the shores of Ghana each week. Or it could have ended up on the mountain of clothes in the Atacama Desert in Chile, a pile so big, it's now viewable from space.
Fashion waste levels have reached 92 million metric tons. To put that into perspective, because sometimes big numbers are really hard to conceptualize, if you took every single person that lived in Europe, we're talking hundreds of millions of people, and you brought them all together and you put them all on one massive weighing scale, they still wouldn't be as heavy as the amount of clothing waste we're producing annually. And it's growing and it's unsustainable.
But fashion waste is only one side of the coin. We are producing so many clothes that the fashion industry's carbon emissions each year are more than all international air travel.
So the question is, how do we go about generating less fashion waste and in turn reduce the amount of clothes we're producing? Well, to me, the answer is simple. When we value clothes correctly, we care for them, we repair them, we alter them to fit us, even if our bodies change, we don't just throw them away and buy more.
But how did I, and how do we all, go about changing our mindset away from one of disposability and towards one of value and longevity? Well, I'd like to take you to look at my sister's jeans. My sister loves these jeans ever since my parents bought them for her 15 years ago before a trip to Copenhagen. My sister is an artist. There's nothing she loves more than to wear these jeans when she paints. They're comfortable, durable, and she even uses them as a place to wipe her paintbrush.
Now these jeans are made of denim, which is a natural fabric. A lot of water, time and care has gone into making these jeans, the time and care of many garment workers. They have value, but their value has only grown over time as there are bits of paint on these jeans that match paintings around the

world. Think, there's a bit of yellow over here that matches yellow in a painting in a gallery in Korea. Or a bit of red on this side that matches a painting in a home in Miami. How incredible is that?
My sister's worn these jeans so much that she's had to use SOJO to get them repaired twice, making them even more hers with every patch, making them even more valued with every stitch. There is so much beauty and power in repairing and caring for our clothes.
So often sustainability can be about the need to give something up. But for me, sustainable fashion isn't about losing anything. It's about gaining a deeper and truer happiness with the clothes that we own. More connection, more appreciation, and more intentional and personal joy.
I think we can all agree that my sister should not throw these jeans away. But that's just one example. But that's just one example. This pair of trousers that I've had tailored to fit that I'm now wearing on the stage at TED, they shouldn't be thrown away either. Neither should that dress that I bought a couple of summers ago with my best friend on a sunny day in a Camden charity shop. Neither should that jumper that I was wearing when my dad looked at me and said he was proud of me.
Clothing can just be clothing. It can be a quick fix, a passing trend, a forgettable item that we wear once for that random date. Or it can be something thoughtful, a material, style and shape that works for us, something we want to wear over and over again and something that embodies the story and the experiences of our life.
Every single one of us is wearing clothing. So I want you to stop for a second and think. That top, those trousers. Do you know which field in which country across the world grew that amazing cotton? Which woman with what family and what life sewed your seam together? Where have you worn those clothes? What experiences have you had in them? Will you still have them in 60 years' time? Why wouldn't you? Imagine if when you were giving an item away, you saw the entire creation journey of that item. And you saw all the times that you'd worn it.
There is no denying that responsibility for this unsustainable system that we live in lies with governments, legislation, corporations and brands. But there's also no denying that we are the ones doing the insatiable amounts of buying and we are the ones doing the throwing away. And with that, there is so much power and opportunity for us to collectively move ourselves away from a culture in which what we buy is easily thrown away and instead move us to a culture in which what we buy is loved and valued more.
I've just been talking about clothing today, but really I could be talking about anything as our problems of overconsumption and waste go far beyond just the clothing industry. We need to buy less stuff and we need to look after what we buy. It will mean less global waste, less global production and a reduced negative impact on this planet. Valuing the things that we own is a climate solution. So next time you buy something --
So next time you buy something, maybe it's a pair of jeans for a trip to Copenhagen, or maybe you're in a market in Sierra Leone and you come across a yellow dress, I want you to think "Do I need this?" "What has it taken for this item to get here to me in my hands?" "What story can I create alongside this item?" And "Will I really, truly value it?"

Recording 10.3

Fast fashion is a term that has become increasingly popular in recent years. It refers to the quick and inexpensive production of clothing in response to the latest fashion trends. Fast fashion brands have gained popularity due to their ability to offer trendy clothes at affordable prices. However, there are several negative impacts associated with this industry.
One of the main issues with fast fashion is its impact on the environment. The production of clothing requires large amounts of water, energy, and raw materials. Additionally, the disposal of unwanted clothing leads to excessive waste in landfills. Many garments are made from synthetic materials that do not decompose easily, further contributing to environmental pollution.
Another concern is the working conditions of those employed in the fast fashion industry. In order to keep up with the demand for cheap clothing, many brands outsource their production to countries with low labor costs. This often results in poor working conditions, long hours, and low wages for

garment workers. Furthermore, the pressure to produce clothing quickly can lead to unsafe working environments.

Fast fashion also promotes a culture of overconsumption and disposable fashion. With new trends constantly emerging, consumers feel the need to constantly update their wardrobes. As a result, clothing is often discarded after only a few uses, leading to a cycle of excessive consumption and waste.

To address these issues, there has been a growing movement towards sustainable fashion. This involves the production of clothing using eco-friendly materials and ethical manufacturing processes. Sustainable fashion brands prioritize quality over quantity and encourage consumers to buy less but choose well. Additionally, there is an emphasis on recycling and upcycling clothing to reduce waste.

In conclusion, while fast fashion may offer affordable and trendy clothing, it comes at a high cost to the environment and workers in the industry. It is important for consumers to be aware of the negative impacts of fast fashion and consider more sustainable alternatives. By making conscious choices and supporting ethical and sustainable fashion brands, we can contribute to a more responsible and environmentally-friendly fashion industry.

UNIT 11

Recording 11.1

THE GROWING MEGAFIRE CRISIS AND HOW TO CONTAIN IT

https://www.ted.com/talks/george_t_whitesides_the_growing_megafire_crisis_and_how_to_contain_it

Wildfire is a large and growing challenge to the West and to the world. What happened in Santa Rosa is becoming all too common. Paradise in 2018, Australia in 2020, Europe in 2022. And fire experts say that we should get ready for more Santa Rosas because it's likely to get worse before it gets better.

Now beyond the major costs in lives and property and the economy, there's also a big carbon impact to wildfire. In fact, the additional carbon from California's 2020 wildfires was greater than the carbon that Californians had worked so hard to save over the previous two decades.

The largest fires are called megafires. These are the ones that burn over 100,000 acres with the intensity that can threaten aquifers and biodiversity, and even cause forest conversion, in which trees are so damaged that they just don't grow back. These fires are getting worse as well. In fact, eight of the ten largest megafires in California history have happened over just the last five years.

Many people feel overwhelmed by this situation. I know I did. So two years ago, working with great people, I closed a chapter of my life in aerospace and I started a new journey to see if I could understand the wildfire crisis better and what could be done about it. I started working with leaders from firefighting and philanthropy, entrepreneurship, science, tribal communities, and together we cofounded an organization called Megafire Action, whose sole purpose is to solve the megafire crisis.

And I've come to believe that if we take a holistic approach, we have an opportunity to establish a new relationship with fire, to work safely with fire and potentially to solve this wicked problem. The path forward has three solutions. The first is fire-adapted communities, the second is resilient landscapes and the third is innovative fire management.

So for the first, fire-adapted communities, what we need to do is to clear the brush and the vegetation from homes, from the immediate proximity of homes. Next, we need to use fire-resistant materials in the homes and the roofs. And then the third thing is to, where possible, protect against embers, flying embers, by protecting the home from openings like your air vents and your chimneys. Now communities have a strong shared interest to perform this work along the exterior boundary of the community because it reduces the chance that fire will penetrate deeply into the city, as it did in Santa Rosa.

The second solution is resilient landscapes. And if you take one lesson from this talk, it's this. In order to solve the megafire crisis, we need to bring our western landscapes back into a healthy balance by reducing the overgrown brush and trees in the wildlands and the forest. Here we're finally starting to take to heart the wisdom of the Indigenous peoples of the Americas who knew that fire was a natural part of the landscape and who introduced low-intensity fire, good fire, on a regular basis, at the right times. When this is done well, as around the communities of South Lake Tahoe, then it can actually divert a megafire as bad as the one that they experienced in 2021. It can also potentially prevent a megafire from occurring, which is what some people think happened in Napa of last year.

But the scale of this challenge is huge. There are hundreds of millions of acres of wildland in the American forests. The Forest Service hopes to reduce the risk on 50 million high-priority acres over the next ten years. But the challenge is that they're only accomplishing a few million acres a year. And so we're not at the pace or scale that we need to do to address this challenge. So what do we need to do?

Well, the first thing that we need to do is to essentially hire, train and retain many more workers who will be doing the hard work of defusing the time bombs inside our western forests. We need to pay them well. We need to support them with full-time work and we need to protect them from liability where necessary.

The next thing we need to do is to empower them with innovation. And right now there are an incredible number of great companies and organizations that are working to bring this innovation to reality. Just one of these companies is called BurnBot, and what they're hoping to do is to make controlled burns safer and faster. They're going to establish a burned perimeter around an area with the remotely piloted rover and then they can bring a drone into the middle of it, drop some fire into it and burn that interior area safely. It's a brilliant but a simple idea. And I think we're going to need a lot more of this kind of innovation if we're going to scale up to the to the size of the problem that we have before us.

Now the first two solutions that I've talked to you about are pretty well agreed. The third one, innovative fire management, is somewhat more controversial, but I think it offers huge potential to address and solve the wildfire problem. What we need is innovation and technology that can rapidly detect and assess fire and then quickly put it out when it gets bad. And here, speed is paramount, because when you're in the worst kind of fire days -- these are the hottest, driest and windiest fire days -- if you can't bring fire management resources to a fire very quickly, then it is likely that you won't be able to contain that fire.

Here we need to look at the example of the Quick Reaction Force of Southern California, which is really designed in some ways for these toughest days. The QRF is a public-private partnership, which now has three Chinook helicopters. These are the big ones with the two rotors on the top. And each of them can drop up to 3000 gallons of water on a fire, day or night, and they can do it very precisely. They can also refill up to six times an hour so they can bring a lot of mass to the problem. Over the course of two years of demonstrations, the QRF has demonstrated that this model has great potential, that, in fact, if you can bring a lot of fire management resource to a fire very quickly, you can get on top of fires before they get big and unmanageable. And this opens up an exciting potential future.

Imagine this model with a series of larger drone vehicles distributed across the landscape in higher-fire-risk areas. Imagine these vehicles positioned periodically along utility lines or in areas of higher fire-risk deep in the forest. Such a distributed network, if connected to the right sensor system, could offer a future in which we are able to really put out fires on the worst fire days, and even in remote communities. Companies like Rain and Joby Aviation are working on this vision today.

The sensor system will also be very important for the resolution of this problem. The system -- which will entail both ground-based, aerial and space-based platforms -- won't be important just because we're going to be able to see and detect fire where and when it pops up, but also because it'll enable

us to differentiate between good and bad fire, low-intensity fire and high-intensity fire, which is very important because we need more lower-intensity fire on the landscape to rejuvenate our forests, just as much as we need to know where and when fire risk is becoming higher intensity.

Fire is a prism through which we can see the future of humanity's relationship with natural systems. Working together and supported by technology, we can build a world in which communities are resilient to wildfire and in which forests are brought back into a healthy balance. Ultimately, we can build a future, in which we don't just manage fire to protect human life and property, but also to protect the biosphere for global carbon emissions and for biodiversity. Ultimately, we need to become the crew of Spaceship Earth. So let's get to work. Let's learn from fire and let's build a resilient, sustainable future.

Recording 11.3

A wildfire is an uncontrolled fire in an area of combustible vegetation that occurs in the countryside or a wilderness area. Other names such as forest fire, brush fire, bushfire, grass fire, hill fire, peat fire, vegetation fire, and veldfire may be used to describe the same phenomenon depending on the type of vegetation being burned. A wildfire differs from other fires by its extensive size, the speed at which it can spread out from its original source, its potential to change direction unexpectedly, and its ability to jump gaps such as roads, rivers, and fire breaks. Wildfires are characterized in terms of the cause of ignition, their physical properties such as speed of propagation, the combustible material present, and the effect of weather on the fire.

Wildfires can occur anywhere in the world, but are common in the wildland areas of the United States and Australia. They can be sparked by natural causes such as lightning, by human causes such as arson, or by an act of nature such as a volcanic eruption. The threat of wildfires can be reduced by such measures as the use of fire retardants in vulnerable areas, the construction of firebreaks, and controlled burns for vegetation management. Houses built in wildfire-prone areas can be made of more fire-resistant materials, and landscapes can be maintained to reduce the likelihood of fire spreading.

Wildfires can cause extensive damage, both to property and human life, but they also have various beneficial effects on wilderness areas. They help to maintain the natural balance between plants and animals, and they stimulate growth and regeneration in forests. Some plant species depend on the heat of wildfires to release seeds or to clear away competition from other plants. Many animal species depend on wildfires for their habitat, and some types of trees rely on fire to release their seeds.

UNIT 12

Recording 12.1

THE HIDDEN WONDERS OF SOIL

https://www.ted.com/talks/jane_zelikova_the_hidden_wonders_of_soil

Under our feet, there is an unseen world more diverse than all the tropical rainforests combined. Teeming with microbial life and critters, large and small, this hidden world of soil is on every single continent. But most of us know little to nothing about this vast world under our feet. And for most of my life, I was no exception.

I grew up a very curious and adventurous kid. I spent a lot of time climbing trees and falling out of them. And I spent a lot of time getting really dirty. In college, I had to take a class for a science requirement, and I was shocked to discover that being really curious and loving dirt could be a legitimate career. So it took no convincing whatsoever for me to change my major, and that's how I became an ecologist.

In graduate school, I studied how the loss of a seed disperser, in this case, the winnow ant, affected the plants that they disperse. In my research site, we were discovering that these ants were moving up in elevation to escape a rapidly changing climate. But they were leaving the plants they dispersed

behind. So while I came to grad school to study ants, I all of a sudden found myself studying climate change. And because ants nest in soils, I had to learn a lot more about soil.
What I couldn't have predicted, as that young, curious, budding ecologist, was that I would spend the next decade of my life thinking about the invisible army of soil microbes and how we can harness their awesome powers to help address climate change.
But before we get to all of that, let's start at the beginning. Soils are considered to be the skin of the Earth. They're only a few meters thick, but they support all agriculture and every single terrestrial biome. Soils help protect our food supply, clean our water, boost our immune systems, and they serve as a source for some critical medicines, including many that have yet to be discovered. Without Earth's exceedingly thin layer of soil and its multitude of organisms, we would not eat, and humanity as we know it may not exist.
And soils, like many good things, they take time to develop. They form over hundreds to thousands of years as rocks break down and plants and animals decompose. As soils form, they accumulate and store carbon. In fact, there are billions of tons of carbon stored underground. Two to three times more than what we have in the atmosphere. Plants and soil work in collaboration to drive the single most important transformation of carbon on this planet, photosynthesis. Plants take carbon dioxide from the air, and they combine it with water and sunshine to create sugars. And of course, to grow plants. Plants and their sugars eventually decompose in the soil, feeding the microbes. In fact, most of the carbon that comes in through plants ends up in soil at some point. The carbon cycle continues. Microbes and their carbon eventually break down, and the carbon from the microbes sticks to soil particles, creating what we call soil clumps or aggregates. Because microbial carbon is sticky. So when that microbial carbon ends up in a clump, it's physically protected from further decomposition. And what we know now is that the majority of soil carbon that is sequestered is actually dead microbes or what we call microbial necromass. That necromass can stick around in soils for decades to millennia, especially if we leave soils undisturbed.
But over the last 12,000 years, we have lost billions of tons of carbon from our soil as humans converted grasslands and forests into agricultural fields and range lands, building roads and cities. One of the major drivers of that loss was the plow, which, at the time, was a major technological breakthrough that really revolutionized agriculture and altered the trajectory of human history. With each pass of the plow, those plant roots and soil aggregates that we know are really important are broken apart, exposing carbon to decomposition. Today we use more than a third of our land to feed and clothe billions of people on this planet. But we're losing our soils at an alarming rate, and with it, we're losing their fertility. Without that soil, it's going to be a lot harder to feed what is going to be close to 10 billion people on this planet by 2050. That's going to put a lot more pressure on what is already a disappearing and resoundingly underappreciated resource.
There is no machine that can bring soil back. No technology that can do what thousands of years of rock weathering and biological activity have achieved. But we can build our soils and put more carbon underground with a little help from plants and microbes. Rebuilding soil is going to require us to fundamentally rethink our reliance on technology and chemicals to deliver what soils can do on their own: support life.
And life in soil is mostly microbial. The Dutch scientist, Antoni van Leeuwenhoek, saw tiny organisms he called the "wee beasties," under his microscope about 350 years ago. And with the rapid innovation of molecular and computational tools, we are finally getting a sneak peek at who they are and how they make their way in the world.
Here's the thing. A teaspoon of soil holds billions of organisms, things like bacteria, fungi, protists and archaea. These microbes are the movers and shakers of nature's carbon cycle. They drive really important processes in soil, they take organic matter and convert it into complex carbon molecules. And having more carbon in soil is transformative. As carbon accumulates, agricultural fields can hold on to more water and more nutrients, building resilience that helps them deal with the ups and downs of a changing climate. That resilience means plants can grow more consistently, even when the weather is fickle. And the awesome thing is carbon-rich soils help buffer us against what is an uncertain climate future. The trick is to really rethink how we do agriculture.

So there is the good news, which is there are some tried and true ways that we can get more carbon in our soils and build our soils back. We can plow less, and we can make sure that we have roots in the ground year round, feeding the microbes and powering that microbial engine humming under our feet. And we can do this.
The other thing is, diversity is the key ingredient in this recipe. Diverse plant communities support diverse microbial communities that can transform and store more carbon. Diversity is good for soils, and it's good for climate mitigation. Just like we need every microbe, we need every farmer and rancher, every climate solution and every solver.
So ... Healthy, carbon-rich soils matter today more than ever. The other great thing about carbon-rich soils is they help farmers have more consistent agricultural operations and more sustainable ones that can withstand the ups and downs of a changing climate. That's a huge win for the people that grow our food, it’s a win for climate, and it’s a win for us consumers. So how do we do it?
Well, there are three simple things we can do. Number one, we have to protect our soils and the carbon they already hold. Number two, we can get more carbon underground by growing diverse, climate-adapted crops. And number three, we can let the microbes do their thing. Leave them alone by leaving the soil undisturbed. It sounds simple, and that's because it kind of is. But there are some questions that are left to be answered, and there's a lot of room for us to innovate. We need to track and measure our climate progress. We need to develop more climate-resilient crop varieties that can grow deeper roots and pump carbon underground deeper. And we need to rethink our economic models and agriculture and help support and incentivize these carbon-sequestering agricultural practices. So lots of room for innovation, lots of room for research. Good news for us scientists.
But we don't have time to waste. Climate change is here and it's affecting all of us, whether we know it or not. It's affecting every single ecosystem, including agriculture. Soils are the literal foundation of life on this planet, the reason that we can eat and the climate solution just waiting to be unlocked. So let's build back our soils, help our planet by looking down to the ground.

Recording 12.3

Soil fertility refers to the ability of soil to sustain agricultural plant growth, i.e. to provide essential plant nutrients and water in adequate amounts and proportions for plant growth and reproduction. Soil fertility is a complex process that is determined by the combination of physical, chemical and biological properties of the soil.
Physical properties like texture, structure, porosity, and moisture-holding capacity determine the soil's ability to hold water and air, and to provide a suitable environment for plant roots to grow and take up nutrients. Chemical properties like pH, nutrient content, cation exchange capacity (CEC), and organic matter content influence the availability and uptake of nutrients by plants. Biological properties like microbial activity, earthworm activity, and the presence of beneficial organisms like mycorrhizal fungi contribute to nutrient cycling and the release of nutrients from organic matter.
Soil fertility can be improved through various management practices, such as organic amendments, crop rotation, cover cropping, and reduced tillage. Organic amendments like compost, manure, and green manures add organic matter to the soil, which improves its structure, water-holding capacity, and nutrient content. Organic matter also provides a food source for beneficial soil organisms, which help break down organic matter and release nutrients for plant uptake. Crop rotation involves growing different crops on the same field in a planned sequence over time. This helps reduce pest and disease pressure, improves soil structure and nutrient cycling, and reduces the need for synthetic fertilizers and pesticides. Cover cropping involves growing non-cash crops like legumes or grasses during fallow periods or between main crops. Cover crops help prevent erosion, suppress weeds, improve soil structure, and add organic matter to the soil. Reduced tillage involves minimizing the disturbance of the soil by reducing the number and depth of tillage operations. This helps conserve soil moisture, reduce erosion, and improve soil structure and organic matter content.
Soil fertility is crucial for sustainable agriculture and food security. A fertile soil can produce healthy crops that are more resistant to pests and diseases, require fewer inputs like fertilizers and pesticides, and have higher nutritional value. On the other hand, a degraded or infertile soil may result in poor

crop growth, reduced yields, increased pest and disease pressure, and nutrient imbalances that can affect human health. Soil degradation is a major global challenge, with an estimated one-third of the world's soils being degraded due to erosion, nutrient depletion, salinization, acidification, pollution, and other factors. Sustainable soil management practices that promote soil fertility are essential for protecting and restoring soil health, ensuring long-term agricultural productivity, and mitigating climate change through carbon sequestration in the soil.

In conclusion, soil fertility is a critical factor for agricultural productivity and sustainability. It is influenced by a combination of physical, chemical, and biological properties of the soil, and can be improved through various management practices. Protecting and enhancing soil fertility is essential for ensuring food security, conserving natural resources, and maintaining a healthy environment for future generations.

UNIT 13

Recording 13.1

A BOLD PLAN TO PROTECT 30 PERCENT OF THE EARTH'S SURFACE AND OCEAN FLOOR

https://www.ted.com/talks/enric_sala_a_bold_plan_to_protect_30_percent_of_the_earth_s_surface_and_ocean_floor?utm_campaign=tedspread&utm_medium=referral&utm_source=tedcomshare

When I was a kid growing up in the Mediterranean, I was fascinated by the underwater world that Jacques Cousteau showed us on TV. When he started filming in the mid-1940s, the Mediterranean shores were still full of large fish. But when I went to the sea to swim in the '70s, I saw none of that. There were sea urchins on a barren bottom, but I never saw a large fish. The industrialization of fishing after the World War II put the latest nail in the coffin of Mediterranean marine life.

I thought nature was lost. Until I started scuba diving in the Medes Islands marine reserve in Spain. One square kilometer fully protected from fishing and other damaging activities. I still remember that first dive in the reserve. As soon as I put my head underwater, I felt like diving into one of Cousteau's films. What was missing from the sea of my childhood was there. Groupers, sea bass, octopus, scorpion fish, seaweed forests. Just a few years of protection had allowed the sea to bounce back. I have seen this miracle happen in other areas across the ocean, like in Cabo Pulmo, Mexico, where local fishermen were so upset with not having enough fish to catch, that in the mid-'90s, they asked the Mexican government to create a no-take area. A national park in the sea. We surveyed the marine environment then, and the place was an underwater desert. When we returned a decade later, everything had changed. What had been a barren sea was now a kaleidoscope of life and color. We saw it come back to pristine in only 10 years, including the return of the large fish like groupers, jacks and sharks. And those visionary fishermen are better off now. From diving tourism inside the reserve and better fishing around it.

But today, globally, only seven percent of the ocean and less than a fifth of our land have been protected. That means that we have converted most of our planet into a tame environment, where 96 percent of the mass of the mammals is us and our domesticated livestock. Only four percent is everything else, from pandas to tigers to elephants. And we have removed over 90 percent of the large fish in the ocean in the last century alone. On top of the loss of nature, we have global warming. The summer of 2021 has seen some of the hottest temperatures in human history, in places that one would expect to be cool, like Canada, Finland and Siberia. This extreme heat kills hundreds of thousands of people. It fuels raging wildfires, turning towns, forests and grasslands into ashes, also killing billions of individual animals and trees and many coral reefs around the world.

No place is safe anymore unless we rewild our planet. If we are to prevent a global disaster, we need to do two things. As we know, we need to reduce emissions of greenhouse gases to almost zero. But

we also need to draw down the excess carbon pollution in the atmosphere and in the ocean. How can we do that?

To capture the excess of greenhouse gases, we need nature's help. Because trees, grasslands, peatlands, mangroves, kelp forests and healthy oceans are the best and most efficient technologies to remove carbon from the atmosphere, and they already exist. As long as we protect them, they do the removal for free. The more biodiversity there is, the more carbon pollution it can absorb, the more it can help stabilize the climate. And biodiversity also gives us clean air and water, food and protection from floods, storms and even wildfires.

The problem is that nature cannot keep up with us. The biodiversity that is left today is not enough to absorb our impacts any longer. That's why in 2018, I put together a team of top scientists and economists to answer the question of which areas in the ocean we must protect first. And how much of the ocean do we need to protect? We decided to focus on three objectives: biodiversity, food and carbon storage to help mitigate climate change. If we think of each objective in isolation, there are tradeoffs. Protecting the top areas for biodiversity could result in a loss of fishing catch, for example. To solve that problem, we developed a new framework to optimize multiple benefits. Picking which areas to protect depends on how much we value the different objectives. We found that if we gave the same weight to each biodiversity, food and carbon, we would want to protect the right 45 percent of the ocean to maximize the three benefits. We also found that even if we didn't value biodiversity, the minimum amount of ocean we would protect would be 30 percent. So 30 percent of the ocean is the floor, the minimum area that we need to protect if we want to preserve marine life and all the benefits it provides for people. Similar analysis has been done for the land, also showing 30 percent as a minimum. Armed with this research, we at National Geographic partnered with the Wyss Campaign for Nature, and launched a campaign for "30 by 30," meaning at least 30 percent of the planet, land and sea, protected by 2030. Working with the governments of Costa Rica, France and the United Kingdom, we built the High Ambition Coalition for Nature and People, which now has 66 countries in it and growing, all supporting "30 by 30" as a main target for a global deal on nature.

Thirty percent of our planet by 2030. Only that amount of wild nature, together with a massive reduction in carbon emissions, will be able to get us back on track.

And of course, we need to manage our activities more responsibly everywhere else. "30 by 30" will involve a combination of strategies. From national parks and marine protected areas, to lands managed by Indigenous peoples and local communities, which have been effective in preventing habitat loss, often more effectively than conventional conservation methods. Expanding recognition of the land rights of Indigenous peoples is an effective and moral solution for protecting our world. And protecting the land can be done only together with the people living on it, like Canada is doing with its Indigenous, Protected and Conserved Areas.

Some will say, however, that we cannot afford to protect our natural world. Well, let's look at the numbers. A study has put the cost of protecting 30 percent of the planet at about 140 billion dollars a year. That's only a fraction of the money that governments use to subsidize industries that pollute our air, waste our soil and empty our ocean. We need to reverse the flow of that money from funding the destruction of our life support system to preserving it. The solution to the problem we have created has been here all along. I understand that the idea of protecting a third of our land and ocean may feel threatening to those who see only the short-term profits of their destruction. But I am hopeful because I have seen with my own eyes how nature can recover in those marine reserves. And I have seen how the return of nature has helped people thrive and build a better life. We just need to give nature the space it needs so she can continue providing for us.

Recording 13.3

The Great Barrier Reef Marine Park is a marine reserve in Australia established to protect the Great Barrier Reef, one of the world's most significant natural wonders. Spanning over 2,300 kilometers

(1,400 miles), it is the largest coral reef system on Earth and supports a remarkable diversity of marine life.

The Great Barrier Reef Marine Park was created in 1975, and its primary objective is to conserve the biodiversity of the reef ecosystem while allowing for sustainable use. The park is managed by the Great Barrier Reef Marine Park Authority (GBRMPA), a government agency responsible for protecting and managing the reef.

As a marine reserve, the Great Barrier Reef Marine Park has several zones with different levels of protection. The most strictly protected areas are called green zones, where all forms of fishing, collecting, and removing any marine organism or material are prohibited. These green zones cover about 33% of the park and include critical habitats like coral reefs, seagrass beds, and mangrove forests.

In addition to the green zones, there are also yellow zones, which allow for limited recreational fishing and some other activities, and blue zones, where most activities are permitted as long as they are sustainable and do not harm the environment. The zoning system helps balance the need for conservation with the interests of various stakeholders, such as commercial and recreational fishers, tourism operators, and Indigenous communities.

The Great Barrier Reef Marine Park faces numerous threats, including climate change, pollution, and coastal development. Rising ocean temperatures cause coral bleaching, a process that can lead to the death of corals and the loss of habitat for many other species. Pollution from land-based sources, such as agricultural runoff and plastic waste, can degrade water quality and harm marine life. Coastal development, such as port expansions and dredging, can damage seafloor habitats and disrupt the natural processes that sustain the reef.

To address these challenges, the Great Barrier Reef Marine Park Authority has implemented various management strategies. These include monitoring and research programs to assess the health of the reef, regulations to reduce pollution and sediment runoff, and initiatives to promote sustainable tourism and fishing practices. The authority also works closely with Traditional Owner groups, who have been custodians of the reef for thousands of years, to incorporate Indigenous knowledge and perspectives into decision-making processes.

The Great Barrier Reef Marine Park is not only a vital sanctuary for marine life but also a significant economic asset for Australia. It supports a range of industries, including tourism, commercial fishing, and scientific research, and generates billions of dollars in revenue each year. However, its long-term survival depends on global efforts to combat climate change and protect marine ecosystems. By raising awareness about the importance of the reef and supporting conservation initiatives, we can help ensure that this natural wonder continues to thrive for generations to come.

UNIT 14

Recording 14.1

EARTH'S ORIGINAL INHABINATNTS AND THEIR ROLE IN COMBATING CLIMATE CHANGE

https://www.ted.com/talks/steven_allison_earth_s_original_inhabitants_and_their_role_in_combating_climate_change?utm_campaign=tedspread&utm_medium=referral&utm_source=tedcomshare

Microbes are everywhere. They live in the air, the ocean, the soil and on our bodies, lots of them. But before you reach for the hand sanitizer, take a look at these beautiful bacterial mats in Yellowstone's Grand Prismatic Spring. They're absolutely amazing because they've somehow figured out how to grow happily at near boiling temperatures. Ever since life on Earth began, probably in a place like this, microbes have kept planetary chemical cycles in balance. Today, humans are altering that balance and changing the climate by emitting greenhouse gases into the atmosphere. But microbes

might be able to help us with our climate problem. After all, microbes are Earth's original and most adaptable inhabitants.

Now, I know that not everyone is so enamored with microbes. My biology students tell me that they usually think of "pathogen" when they hear the word "microbe" and I know we're in the middle of a global viral pandemic. But you should keep in mind that far less than one percent of microbial diversity is actually pathogenic to humans. In fact, most of the microbes we encounter are beneficial. There are trillions of bacteria, fungi and viruses living in and on us right now, more of them than human cells in the body. They help us digest our food, protect us from disease and maybe even choose our mates. Microbiologists call this assemblage of tiny interlopers the human microbiome.

We now know that there are microbiomes in basically every environment. In the same way that they help our human bodies stay healthy, microbiomes in water, soil and air are critical for planetary health. For example, cyanobacteria in the ocean carry out photosynthesis and provide a large fraction of the planet's breathable oxygen. Even though they're tiny, their green color can be seen from outer space with satellites. They may be harder to see, but microbiomes in the soil are just as important as the human or ocean microbiome.

I think about soil as a skin for the planet that provides nutrients to sustain crops and other plants. As an ecologist and climate scientist, I've been studying the microbes that live in soil for 20 years now. Just like we've seen with the human microbiome, cutting-edge techniques in molecular biology, especially DNA sequencing, show that soil microbiomes are extremely diverse in their genes and life cycles. Scientists are starting to figure out how we can harness the diversity of these often invisible organisms to solve global problems like climate change and food insecurity.

Take agricultural crops, for example. With climate change causing more frequent heat waves and droughts, crop plants may become stressed, reducing yields and threatening food security. But microbes can help. There are symbiotic fungi called mycorrhiza that grow out from plant roots and into the soil where they collect water and nutrients. Then the plant and its symbiotic fungus make a trade. The fungus sends water and nutrients into the plant roots and the plant pays back the fungus with sugars from photosynthesis. To reduce stress on plants from climate change, farmers can inoculate the soil with these beneficial fungi. Land managers are also starting to use the same approach to help native plants recolonize degraded soil during habitat restoration. So the next time you support an environmental cause, maybe through a nonprofit donation or volunteer work, remember, soil microbes need conservation too.

The planet also relies on soil microbiomes for other essential services. Have you ever thought about what happens to living things like these leaves, mosses and mushrooms when they die? I'm not talking about an existential crisis. I'm talking about microbial decomposition. Think about it like a type of biological recycling practiced by very diligent microbes. They take dead bodies and turn them into useful nutrients. Without this essential service, life on Earth would grind to a halt because dead stuff would pile up, depriving the next generation of life forms of the raw materials needed for growth.

Hundreds of researchers funded by the US Department of Energy are even trying to figure out how to co-opt microbial decomposition to produce sustainable biofuels from wood, grasses and other plant materials. Fuels derived from plants and microbes are part of the climate solution because they don't rely on fossil carbon sources like coal and oil. At the same time, ecologists like me are very concerned about how climate change might affect microbial recycling in the environment. A warming climate might speed up the process and release more greenhouse gases into the atmosphere. A drier climate might slow down the microbes and leave plants starved for essential nutrients.

Fortunately, there is reason for hope. Microbes are super adaptable because they can evolve very quickly. For example, you may have heard of pathogenic bacteria like staph evolving antibiotic resistance. Of course, that's bad for us. But the same evolutionary process could also help microbes adapt to climate change, which is good. After all, microbes evolved long ago to survive extreme conditions like the hot springs of Yellowstone. Just like our human cells, each microbial cell contains a genome. And just like our genomes, microbial genomes contain genes or DNA sequences with instructions for growth and survival.

My colleagues and I have identified genes that allow bacteria and fungi to survive drought and decompose dead plant material. We're currently doing experiments to see how fast these genes evolve and what kinds of genetic changes make bacteria and fungi more resistant to drought. Some of our prior research shows that microbes have the potential to deal with climate change. Microbiomes and the services they provide could cope not just by evolving, but also by shifting around the dominant species of microbes.

Microbiomes are so diverse that even if some of the species die out with climate change, others might survive and take their place, allowing nature's recycling to continue.

To test this idea, my colleagues and I designed special cages to contain microbiomes from different habitats in Southern California. We sampled microbiomes from places ranging from forested mountaintops to hot deserts. Each cage contained a microbiome from one of these places along with sterilized dead grass for the microbes to use as a food source. We then put the cages back into the different habitats so that the microbiomes experienced pretty dramatic changes in climate. We expected that the microbes from the cooler places would die out when we moved them to the warm places like the hot desert, and that they would lose their ability to consume and recycle the nutrients in the dead grass material.

But when we looked at the results, I was really shocked. The microbiomes were almost unfazed by this massive climate difference. There were some changes in the dominant species, but mountaintop microbes decomposed dead grass just as well as desert microbiomes in the hot, dry climate. This result tells us the microbiomes have the ability to evolve and shift to deal with really dramatic climate changes.

Another way that soil microbiomes can be part of the climate change solution is by building healthy soil. Many soil bacteria and fungi ooze out sticky chemicals to glue themselves onto soil surfaces. The glue and the microbes form these biofilms that hold soil particles together. This helps the soil resist erosion and hold more water that's available for plants.

Microbes and their biofilms also play a big role in soil carbon sequestration. Many forms of carbon from plants, like sugars, don't last long in the soil because they're food for many organisms, including the microbes. But microbodies and biofilms are made up of complex chemicals. For example, many microbes build cell walls for protection, so the wall material has to be resistant to biochemical attack. When the microbes die, their corpses, especially those cell walls, can stick around for a really long time, maybe even thousands of years. In this way, soil acts a lot like a bank vault for carbon. More carbon in the bank means healthier soil and less greenhouse gas buildup in the atmosphere. Microbes are sort of like the Federal Reserve. They can take cash off the street in the form of these plant sugars and lock it away in a chemical vault for long-term storage.

With the science of climate change becoming more and more obvious every day, we need to figure out how to adapt, for sure. Some scary outcomes, like emerging microbial diseases, are definitely something we need to plan for. But microbes can be a part of the climate solution if we figure out how to leverage all that microbiome diversity.

To be honest, though, making sense out of complex microbiomes is still a big scientific challenge. Their complexity is both a blessing and a curse. We're only beginning to understand all the strange and wonderful microbial lifestyles that have been evolving since the origins of life on Earth. This digital artwork called "Microbes Reimagined" does a great job of capturing that sense of mystery. But one thing we do know for sure is that microbes are not just pathogens. Our lives literally depend on them. So next time you take a breath outside, imagine all those oxygen-spewing cyanobacteria floating around in the ocean, and when the time comes and you draw in that last and final breath, take comfort in knowing that soil microbes will be there to turn your body into useful nutrients.

Even as we enjoy these benefits of microbiomes, climate change remains a potentially existential threat to our well-being. But dangerous climate change is not inevitable, at least not yet. With the right cutting-edge research, diverse microbiomes could become a big part of the solution to our climate problem.

Recording 14.3

Microbes are everywhere. They're in the soil, in the air, and even inside our bodies. But these tiny organisms rarely live alone. Instead, they form complex communities called microbial communities. In fact, scientists estimate that up to 99% of all microbes on Earth live in these communities.

What is a microbial community?

A microbial community is a group of microorganisms that live together and interact with each other. These communities can be found in a wide range of environments, from the human gut to the deep sea. They can also be made up of different types of microbes, including bacteria, archaea, fungi, and viruses.

The members of a microbial community work together to carry out important functions. For example, some microbes produce enzymes that break down organic matter, while others help to fix nitrogen in the soil. By working together, these microorganisms can survive and thrive in their environment.

How do scientists study microbial communities?

Studying microbial communities is challenging because most of the microorganisms cannot be grown in the lab. However, advances in DNA sequencing technology have allowed scientists to study these communities in more detail. By extracting DNA from an environmental sample, such as a soil sample or a drop of seawater, scientists can identify the types of microorganisms present in the sample.

In recent years, researchers have also developed new techniques that allow them to study the functions of microbial communities. For example, metagenomics is a technique that allows scientists to sequence the DNA of all the microorganisms in a community at once. This can provide valuable information about the genes and metabolic pathways that are present in the community.

Why are microbial communities important?

Microbial communities play a crucial role in many aspects of our daily lives. For example, they help to break down organic matter and recycle nutrients in the environment. They also play a key role in human health, both by protecting us from harmful pathogens and by helping us digest food.

In addition, microbial communities are being used in a wide range of applications, from wastewater treatment to biofuel production. By studying these communities, scientists hope to develop new ways to harness their power and solve some of the world's most pressing problems.

What are the challenges of studying microbial communities?

Studying microbial communities is still a relatively new field, and there are many challenges that researchers face. One of the biggest challenges is that most of the microorganisms in these communities cannot be grown in the lab. This means that scientists have to rely on DNA sequencing to study these organisms, which can be time-consuming and expensive.

Another challenge is that microbial communities are incredibly diverse. In a single gram of soil, there can be thousands of different types of microorganisms. This makes it difficult to identify and classify all the species present in a community.

Despite these challenges, scientists are making great strides in understanding microbial communities. By studying these complex ecosystems, they hope to gain new insights into the diversity and functioning of life on Earth.

UNIT 15

Recording 15.1

HOW WIRELESS ENERGY FROM SPACE COULD POWER EVERYTHING

https://www.ted.com/talks/ali_hajimiri_how_wireless_energy_from_space_could_power_everything?utm_campaign=tedspread&utm_medium=referral&utm_source=tedcomshare

Energy and data are the major currencies of our lives today. Over the last couple of decades, we've seen data going from being wired to becoming wireless. And this has helped democratize access to information. Can we do the same thing with energy? Can we send energy when we want, where we want and as much as we want and in the process, eliminate the last wire? If we could do this, the possibilities would be endless. From Earth to space.

I'd like to tell you about our dream of wireless energy transfer today. It starts with something we are all familiar with -- waves. So waves are very essential to our lives. You can hear this talk because of acoustic waves. You can see this talk because of a certain kind of electromagnetic waves, called light. And the odds are, if you're watching it on the internet, you're using some sort of wireless connectivity that relies on wireless and RF waves. If you have two waves that have the same frequency and are going up and down and they come together at some point in space, they will add and make a wave that's twice the height but carries four times the energy. Now, if the same two waves come together at some other place in space, but one is running half a period late, they cancel and you get very little energy, practically no energy.

This is the basis for a process that has been known for a long time. It's called interference. The idea here is that if you go and sit at the edge of a pond and take both hands and put them in the water and move them up and down, each hand makes a wave. But because of the interaction of these waves, there will be some directions where you get more energy and there are some directions that you will get less. Can we make it go only in one direction? Well, you need more hands. And they have to go perfectly synchronized. But if you do that, what happens is that most of your energy starts traveling straight down.

Now, this is a remarkable thing because if you think about each one of those little hands, each one of those little sources, they would send energy all over the place. But when they work together, the result is that the energy is going mostly in one direction. Now, if the timing was the reason for this happening, maybe we can play with it. Maybe we can mess with it and see what happens. So what if each one of these sources goes a little bit after the one next to it? So in that case, what happens is that these waves start going in different directions, and you can change that direction purely by controlling timing and nothing else. Now, this makes it possible to change this direction without any mechanical movement. So it can be almost instantaneous.

You can go even further. You can think about creating a magnifying glass. A focusing system, where you can actually send the energy, most of it, close to 90 percent of it, in one focal point. But again, since you're controlling the timing, you can create different focal points, and you can send it to them. And this is the basis for wireless energy transfer. It's as if you have an army of ants that are working in perfect synchronization. And each one of them contributes a little bit of energy. But as a whole, they send it to the right place.

Now, obviously here, timing is everything, like life and comedy.

So we've taken this concept, and we've built these electronic chips, integrated circuits, that each one of them generates a little bit of power. But again, as a group, they are designed to work in perfect synchronization and drive these little antennas that transmit the energy. Now this army of ants, or army of antennas, is working together to create those focal points of energy. And what I will show you next is some examples of how that actually operates.

So what you have here, for example, is a generator unit that's sending power wirelessly to the two receivers. And here the point is to see how well-defined these focal points are. That LED panel basically is receiving that power and showing it. So you can see energy is going only where it needs to go and nowhere else. You can take this and put one of these generators on the ceiling of your conference room or your living room and transmit energy to various devices that need energy.

Now this generator on the ceiling is going to power a light bulb. Now, as we move the light bulb, what happens is that you see that there's no energy in the new location, but the system finds it, tracks it and sends it to the new location. And you can see that it dynamically tracks it back and forth. You can use this to send energy to one light bulb or to the next one or to both of them at the same time.

Now you can use something like this, for example, to power a drone. This is a battery-less drone that's being purely powered by that generator facing up from the bottom. And it can also use the same tracking approach to track the drone.

So now that we know that we can send energy wirelessly, the question is, how far can we go? Really, how far can we go? Could we put photovoltaics in space, solar panels in space, and collect the energy and send that wirelessly to Earth?

This is not a new idea. The first time it was mentioned, it was in a short science-fiction story by Isaac Asimov from 1941. And what I love about this story is that it's about a self-conscious robot. And the humans describing this idea to the self-conscious robot, after which the robot says, "Do you expect me to believe such a far-fetched, crazy notion? What do you take me for?"

The first question almost always asked is that, “Why do you want to put your solar panels in space? Why don’t you put them up in the desert and be done with it?” Right? A few reasons. First is that in space you get about eight times more energy because you don't have day and night, you don't have clouds, you don't have seasons, and you don't have the atmospheric absorption. Also, now that you have this ability to send energy where you want and when you want dynamically, you can imagine that you have dispatchable power. On top of that, it's an always-available power. This can be used for a place, for example, let's say an island hit by a hurricane where there’s no power. Or a city in war zone where the power infrastructure is being constantly attacked. You can think about using this to send power to a remote village in sub-Saharan Africa where there is no infrastructure for power transmission. And that way democratize the access to energy. Or send it somewhere above the Arctic circle.

So all of these things are great. But the question is, if it has been known for such a long time and it's such a great thing, why hasn't it been done so far?

The main reason is that the way it has been envisioned before, they've been thinking about it as a big elephant. If you're thinking about putting big solar panels in space, collecting the power, generating a lot of energy, and then putting it into a massive parabolic dish antenna and sending it to a fixed location on Earth. Sending things to space is expensive. You pay dollars -- and that's plural -- per gram. The other problem is that even if you could afford it, assembly of something like this in space is still beyond the capabilities that we have today.

So we came up with a very different approach where we took our generators and turned them into flexible, fabric-like structures. We are utilizing the amazing power of electronics, integrated electronics and flexible electronics, to make this very lightweight, flexible, fabric-like structures that you can roll and pack. And this allows you to have these satellites packed for launch and deployed in space, where each one of these units would be about several tens of meters on the side. And then you can pack a whole bunch of them and create a constellation of them that flies in space and forms your power station to send green energy to Earth. This will be flying in formation around the Earth. Obviously, this is not the size of the planet because we're talking about a kilometer across for the whole whole constellation and the planet is a little bit larger than a kilometer.

We've been developing, as a proof of concept, technology demonstrator, and this is called Maple, which demonstrates the power of flexible structures and electronic circuitry to generate and transmit power in space. We integrated that with two other technology demonstrators for deployable structures and photovoltaics that were developed by three teams, led by myself and two of my colleagues. And we integrated into a satellite that was launched recently. And the purpose of this experiment has been to demonstrate the power transfer, wireless power transfer in space.

Now that brings me back to the promise of wireless energy transfer and what it could mean for us. I believe this technology is too compelling to go away. And I believe it's bound to appear in our lives in one form or another. And that is something to look forward to.

Recording 15.3

Solar energy is the most abundant, renewable energy source in the world. Solar energy systems refer to technologies that convert the sun's heat or light to another form of energy for use. The solar energy that reaches the Earth's surface in one hour is enough to power the entire world for a year.
There are two main types of solar energy systems: solar thermal and photovoltaic (PV). Solar thermal systems use the sun's heat to generate electricity or heat water or air for use in buildings or industrial processes. Photovoltaic systems convert sunlight directly into electricity using PV cells made of semiconductor materials. These systems can be used in a variety of applications, from small devices like calculators to large-scale power plants.
One of the primary advantages of solar energy is its abundance. The sun provides more energy in a single hour than the entire world consumes in a year. Solar energy is also a clean source of energy, meaning it does not produce greenhouse gas emissions or other harmful pollutants during operation. This makes solar energy an environmentally friendly alternative to fossil fuels like coal, oil, and natural gas.
Another advantage of solar energy is its versatility. Solar energy can be harnessed and used in various ways, from heating water for residential use to generating electricity for homes, businesses, and even entire cities. Solar energy systems can be installed on rooftops, in open fields, or integrated into the design of buildings. They can also be used in remote locations where it may be difficult or expensive to extend the existing electrical grid.
Furthermore, solar energy systems require minimal maintenance and have a long lifespan. Once installed, solar panels can last for 25 years or more with little to no maintenance. This makes solar energy a cost-effective solution in the long run, especially when compared to the rising costs of fossil fuels. In addition, solar energy systems can provide a reliable source of electricity in areas prone to power outages or with limited access to electricity.
Despite these advantages, there are a few challenges associated with solar energy that need to be addressed. One of the main challenges is the intermittent nature of sunlight. Solar energy systems can only generate electricity during the day and when the sun is shining, which means they cannot provide a constant source of power. However, this challenge can be overcome by using energy storage technologies like batteries or by integrating solar energy with other renewable energy sources like wind or hydropower.
In conclusion, solar energy is a clean, abundant, and versatile source of energy that has the potential to meet a significant portion of our energy needs. With advancements in technology and supportive policies, solar energy can play a major role in reducing greenhouse gas emissions, mitigating climate change, and ensuring a sustainable future for generations to come.

UNIT 16

Recording 16.1

WHAT TO DO WHEN THERE'S A POLAR BEAR IN YOUR BACKYARD

https://www.ted.com/talks/alysa_mccall_what_to_do_when_there_s_a_polar_bear_in_your_backyard?utm_campaign=tedspread&utm_medium=referral&utm_source=tedcomshare

When you think of a polar bear, you might think white, cold, cute, fuzzy, huggable. Or maybe you feel a bit sad, imagining a polar bear floating away on a melting ice floe. Either way, there's a good chance that for you, polar bears are a distant reality.
But think of those living and working in the Arctic. For them, melting ice doesn't mean polar bears floating away. It means the bears getting stuck on land and more desperate for food. For them, polar bears can be a daily reality. And whether this reality feels safe or scary depends on how well prepared people are to coexist with the world's largest four-legged predator.

After working and living off and on with polar bears for over 12 years, I know coexisting with them can be a challenge, and it will only get more challenging as climate change forces our species to increasingly overlap in the coming decades. With my organization, Polar Bears International, I'm focused on conserving wild polar bears while respecting and assisting those who share their coastlines with this carnivore.

To understand how to best coexist with polar bears, we first need to understand them. And I think one of the best places to start is with one of the most common questions I get asked, which is, "How are they actually doing?" It's a great question. It's simple, but the answer has some nuance and can depend on where we're looking in time and space.

If we could pause time and stop all the impacts we're having on the planet, then sure, right now the species would be okay. We still have about 25,000 polar bears spread across the Arctic, split into 19 different populations in Canada, Russia, Norway, Greenland and Alaska.

But obviously, we can't pause time. The world is warming and the Arctic is warming faster than anywhere. If we did nothing to change our current path, we could lose most of the world's polar bears by the end of the century due to habitat loss. Populations are experiencing changes at different rates depending on where they are, but ultimately all will be impacted unless we collectively switch to cleaner energies.

So we're racing time to tackle climate change in the long term and in the short term, trying to keep as many polar bears in the wild as possible. But in the short term, one of the biggest hurdles these charismatic megafauna face is us.

Polar bears use the frozen ocean for traveling, mating and hunting their main prey: seals. Specifically, high-calorie seal blubber. Polar bears can't outswim seals, so they use the sea ice to sneak up on unsuspecting prey. Polar bears need sea ice for sustenance and survival, period.

So what happens when ice bears start losing their ice? They get stuck on land and they get hungry. Polar bears want and need blubber, but they're still bears, so they will follow their noses to fill their tummies, whatever that takes. But it takes a lot. Just one polar bear needs a lot of seals, and just one seal is equal to about 74 snow geese or 216 snow goose eggs -- it's a big omelet -- or three million crowberries. This amount of food doesn't exist on the tundra in quantities great enough to sustain a population of blubber-hunting ice bears.

So when polar bears can't find good food to eat, just like people, they'll fill up on junk food. And for polar bears, junk food is human food. And for a hungry bear, the best late-night fast food takeout can be their northern neighborhood's trash. But we have a saying in conservation: a fed bear is a dead bear, and this has major implications for coexistence.

Many people work and live across the north, and some Indigenous cultures have centuries-old, deep knowledge of polar bears. But as the world is warming and bears are spending more time on land, more people are moving north and also spending more time on the land and bringing with them more food and more garbage. And they might not be so bear aware.

This is a rising safety concern for humans who are always the number-one priority. It's also a concern for the bears because when a polar bear has a negative encounter with a human, it risks being taken out of the population in a defense kill, which is the legal killing of an animal to defend life or property. Now here, I should also mention that in parts of the range, polar bears are harvested under a quota system informed by science and Indigenous knowledge. If I don't mention it, people can think I'm hiding it, and when I do, they can be surprised that I'm not opposed. It is incredibly important that we protect the rights of Indigenous peoples to practice their traditions. And right now that practice is not a significant threat to the species. Where we could see population-level impacts is through climate change, or if defense kills, which count toward quotas, defense kills start rising above the relatively low quotas. That's when I worry.

But people can't worry about conservation when their lives are at risk. So we need to help limit negative polar bear encounters and support people in protecting themselves with whatever tools work best for them. And to help with that, we can provide tools that are non-lethal.

Luckily, non-lethal tools are available and more are being developed, particularly in Canada, which is home to two thirds of the world's polar bears. And one of the best testing grounds for tools is in the self-proclaimed polar bear capital of the world, Churchill, Manitoba.
Churchill is home to the western Hudson Bay population, some of the best-studied and most-southern polar bears in the world. In this region, the ice-free season is lengthening, meaning these bears are on land longer and have less access to calories compared to their grandparents. This does not mean all the bears are starving to death. It means the females are having a harder time having cubs, the cubs are having a harder time becoming adults and some bears have just moved elsewhere in search of better conditions. As a result, this population has declined from about 1,200 bears in the 1980s, to just over 600 today, almost 50 percent.
Churchill is also home to about 900 people, but grows by thousands during tourist season. And visitors do sometimes ask me, "Do polar bears really come into town or is this some tourism ploy?" Oh yeah, they come into town.
So this is from last fall, which is in bear season, October, November in Churchill, and the local woman had gone out through a living room about 4 am and watched this through her window. And no doubt she called the Polar Bear Alert hotline right after, which is a real thing. But you can tell how big they are, curious and pretty rude.
So polar bears are an economic keystone in Churchill, driving tourism and creating jobs. It's important Churchill protects them and their people, which they do through a wide variety of efforts. But one of the most interesting and effective is their waste management. Unsurprisingly, Churchill's garbage dump used to be outdoors, which was fine until it became a popular polar bear buffet. So this is a problem for the bear's health, but also because when they're on their way to the snack bar, they risk bumping into people.
Polar bears are no more likely to actively hunt and kill people than black bears, But they are more likely to attack near towns, especially when food is nearby. So Churchill did the smart thing, and they've just moved their garbage dump indoors. Now the bears can't even get to it. They also installed residential bear resistant bins, so no polar bear with late night munchies in this town gets any rotten food rewards.
Churchill continues to evolve their waste management because it's key in coexistence. But not everywhere can do what Churchill's done. So we need more options. Polar Bears International is working on innovative technologies that could help provide longer lead times between when polar bears and people meet or prevent them from meeting altogether.
Just one example, GPS tracking. It can tell us where, when and why polar bears move. It's critical data, but we've only successfully collared adult females. Adult males have these like pylon heads with necks thicker than their skulls, and they just pull collars right off. And then the subadults are still growing. And this is really too bad because the subadults, or the teenagers, often cause the most trouble, big surprise.
So we've started working with 3M, the sticky stuff company that makes Post-it notes, and they're helping us figure out how to stick a tracker to any bear's fur. These "burr on fur" tags could be a conservation game changer, letting us temporarily tag any bear that comes too close to a community. And upon relocation, we can track that bear and intercept it before it gets too close. This could help reduce dumpster diving and reduce negative human-bear encounters, keeping both species safer. We also hope the tags could be used on other species that maybe need some support staying away from us humans.
But finally, the number one most important coexistence tool we have is our willingness to cut carbon emissions and stop trapping so much heat in our atmosphere. But on that note, I have some optimism. Sea ice. It's very responsive to atmospheric temperatures. We can keep this habitat in the Arctic, but it will mean drastically reducing our emissions and eventually getting them to zero. Polar bears are fat, white, hairy canaries in the coal mine, warning us to act now. The faster we switch to cleaner energies, the better we can protect future generations of polar bears and people.

I'd be lying if I said I wasn't worried, but action is the best antidote to anxiety. And I'm working to ensure climate change doesn't separate our species for good. But until then, it's bringing us too close together. Coexistence is the only option. Let's make it safe for all.

Recording 16.3

The Arctic is one of the world's most rapidly changing regions, both in terms of climate and geopolitics. The region is warming at twice the rate of the rest of the planet, leading to rapid ice melt and changing ecosystems. At the same time, the opening up of new shipping routes and access to natural resources has sparked increasing competition among Arctic nations. This combination of environmental change and political tension has made the Arctic a focal point for international cooperation and conflict.

One of the most visible impacts of global warming on the Arctic is the loss of sea ice. Every summer, the extent of the ice cover decreases, and each year the minimum ice extent is lower than the previous record. In 2012, the Arctic saw its lowest ever summer ice extent, with only half the amount of ice recorded in the early 1980s. The consequences of this decline are far-reaching. Sea ice reflects sunlight back into space, helping to cool the planet. As the ice melts, more of the sun's energy is absorbed by the ocean, which in turn warms the atmosphere. This feedback loop amplifies global warming, making the Arctic a key driver of climate change.

The melting of the Arctic ice also threatens the survival of iconic species such as polar bears and walruses. These animals rely on the ice to hunt, rest and give birth. Without it, they are increasingly vulnerable to starvation and predation. The changes are not limited to the marine environment; the Arctic's frozen landscapes are also thawing. Permafrost - ground that remains frozen all year round - is starting to melt, releasing large amounts of carbon dioxide and methane, two potent greenhouse gases. Thawing permafrost also poses risks to infrastructure, such as roads and buildings, which were built on the assumption that the ground would remain solid.

As the Arctic melts, it is revealing new opportunities for resource extraction and trade. The retreating ice has opened up new shipping routes, such as the Northern Sea Route and the Northwest Passage, which could significantly reduce travel times between Europe, Asia and North America. The region is thought to hold vast reserves of oil, gas and minerals, attracting interest from both Arctic nations and non-Arctic powers. Russia, in particular, has been investing heavily in its Arctic infrastructure and military capabilities. In 2007, a Russian submarine planted a flag on the seabed beneath the North Pole, symbolising the country's territorial ambitions in the region.

The changing Arctic presents both challenges and opportunities for international cooperation. On the one hand, the melting ice threatens to disrupt ecosystems and displace communities, requiring coordinated efforts to adapt and mitigate these impacts. On the other hand, the opening up of new shipping routes and access to resources could stimulate economic growth and trade. How these competing interests are managed will determine the future of the Arctic and its role in the global climate system.

Rerefences

1. Сулейманова О.А., Беклемешева Н.Н., Карданова К.С. Стилистические аспекты перевода/ О.А. Сулейманова, Н.Н. Беклемешева, К.С. Карданова. – М.: Академия, 2012. – 173с.

2. Петухова Е.В. Words…Texts…Ideas (a practical Course in Semantic analyses): учебное пособие/ Е.В. Петухова. – Курск: Изд-во курск. гос.ун-та, 2010. – 88с.

3. Марчук Ю. Н. Модели перевода: учебное пособие для студентов учреждений высшего профессионального образования/ Ю.Н. Марчук. – М.: Академия, 2010. – 173с.

4. Семенова М. Ю. Основы перевода текста/М.Ю. Семенова. – Ростов н/Д.: Феникс, 2009. – 344с.

5. Сапогова Л.И. Переводческое преобразование текста: учебное пособие/Л.И. Сапогова. – М.: Флинта: Наука, 2009. – 141с.

6. Авербух К.Я. , Карпова О.М. Лексические и фразеологические аспекты перевода/ К.Я. Авербух, О.М. Карпова. – М.: Академия, 2009. – 172с.

7. Миньяр-Белоручка А.П. Англо-русские обороты научной речи/ А.П.Миньяр-Белоручка. – М.: Флинта: Наука, 2009. – 141с.

8. Вейзе А.А. Чтение, реферирование и аннотирование иностранного текста: учебное пособие/ Е.В. Вейзе. – М.: УРАО, 2005. – 103с.

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ДАННОЕ ИЗДАНИЕ ПРЕДНАЗНАЧЕНО ИСКЛЮЧИТЕЛЬНО ДЛЯ ПУБЛИКАЦИИ НА ЭЛЕКТРОННЫХ НОСИТЕЛЯХ