МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ
федеральное государственное бюджетное образовательное учреждение
высшего образования
МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ
ГЕОДЕЗИИ И КАРТОГРАФИИ
(МИИГАиК)

Картографический факультет
Кафедра лингвистики

**ДОКУМЕНТ ПОДПИСАН
ЭЛЕКТРОННОЙ ПОДПИСЬЮ**

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Владелец: Степанченко Алексей Леонидович
Действителен: с 23.09.2026 по 17.12.2027

«УТВЕРЖДАЮ»
Проректор
А. Л. Степанченко
15 мая 2026 г.

РАБОЧАЯ ПРОГРАММА ДИСЦИПЛИНЫ (МОДУЛЯ) «Б1.О.02 ИНОСТРАННЫЙ ЯЗЫК»

Уровень высшего образования: бакалавриат

Направление подготовки: 05.03.06 Экология и природопользование

Направленность(профиль) подготовки: Экология и природопользование

Квалификация (степень) выпускника: бакалавр

Форма обучения: очная

Год набора (приема на обучение): 2026

Срок получения образования: 4 года

Объем: в зачетных единицах: 4 з.е.
в академических часах: 144 ак.ч.

Москва, 2026

Разработчики:
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Рабочая программа дисциплины (модуля) составлена в соответствии с требованиями ФГОС ВО по направлению подготовки 05.03.06 Экология и природопользование, утвержденного приказом Минобрнауки от 07.08.2020 № 894

Согласование и утверждение

№	Подразделение	Ответственное лицо	ФИО	Виза	Дата, протокол (при наличии)
1	Картографический факультет	Председатель ученого совета факультета	Загребин Г. И.	Рассмотрено	26.12.2025, № 6/25

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1. Цель и задачи освоения дисциплины (модуля)

Цель освоения дисциплины - заключается в получении обучающимися теоретических знаний о функционировании языка и его возможностях в рамках новой парадигмы коммуникации – с целью добычи и поиска новых знаний. Основная цель преподавания языка для неязыковых направлений формулируется как «повышение исходного уровня владения иностранным языком, достигнутого на предыдущей ступени образования, и овладение студентами необходимым и достаточным уровнем коммуникативной компетенции для решения социально-коммуникативных задач в различных областях бытовой, культурной, профессиональной и научной деятельности при общении с зарубежными партнерами, а также для дальнейшего самообразования».

Задачи изучения дисциплины:

- формирование четкого представления о требованиях, вытекающих из нового социального заказа на специалиста инновационного типа – такого профессионала, который способен эффективно применять коммуникативные умения при общении на неродном языке, для нахождения и использования информации на другом языке, а также для обеспечения процесса непрерывного самообразования;
- освоение навыков самообучения, рациональных способов изучения материала, собственного целеполагания и планирования, осознание своих качеств как обучающегося и как индивидуальности, умение находить пробелы и сильные стороны в знаниях, в идеале – формирование своего собственного образовательного стиля (включающего самоанализ, самоконтроль, самореализацию). В целом, это также относится и к повышение общей культуры студента;
- формирование умений применять иноязычную коммуникативную компетенцию в изучении основных сфер речевой деятельности при изучении иностранных языков (говорения, чтения, аудирования и письма);
- формирование четкого представления о требованиях, вытекающих из квалификационной характеристики специалиста, которым обучающийся собирается стать, то есть с учетом конкретных потребностей конкретных дисциплин, специальностей и направлений.

2. Планируемые результаты обучения по дисциплине (модулю), соотнесенные с планируемыми результатами освоения образовательной программы

Компетенции, индикаторы и результаты обучения

УК-4 Способен осуществлять деловую коммуникацию в устной и письменной формах на государственном языке Российской Федерации и иностранном(ых) языке(ах)

УК-4.1 Выбирает стиль общения на государственном языке РФ и иностранном языке в зависимости от цели и условий партнерства; адаптирует речь, стиль общения и язык жестов к ситуациям взаимодействия

Знать:

УК-4.1/Зн1 Стили общения на иностранном языке для различных целей и условий коммуникации и партнерства

Уметь:

УК-4.1/Ум1 Использует различные стили общения в зависимости от целей и условий коммуникации и партнерства

Владеть:

УК-4.1/Нв1 Владеет различными стилями общения на иностранном языке в зависимости от целей и условий коммуникации и партнерства

УК-4.2 Выполняет перевод профессиональных текстов с иностранного языка на государственный язык РФ и с государственного языка РФ на иностранный

Знать:

УК-4.2/Зн1 Основные способы работы на языковым и речевым материалом

Уметь:

УК-4.2/Ум1 Выполнять перевод технических текстов с иностранного языка

Владеть:

УК-4.2/Нв1 Приемами самостоятельной работы с языковым материалом с использованием справочной и учебной литературы

УК-4.3 Ведет деловую коммуникацию в письменной и электронной форме, учитывая особенности стилистики официальных и неофициальных писем, социокультурные различия в формате корреспонденции на государственном и иностранном (-ых) языках

Знать:

УК-4.3/Зн1 Нормы произношения, лексику иностранного языка общеупотребительного, терминологического и профессионального содержания; типовые способы построения высказываний в устной и письменной речи

Уметь:

УК-4.3/Ум1 Осуществляет коммуникацию с зарубежными партнерами; переводит научно-техническую литературу, связанную с профессиональной деятельностью

Владеть:

УК-4.3/Нв1 Стратегиями проведения сопоставительного анализа факторов культуры различных стран

3. Место дисциплины в структуре ОП

Дисциплина (модуль) Б1.О.02 «Иностранный язык» относится к обязательной части образовательной программы и изучается в семестре(ах): 3, 4.

В процессе изучения дисциплины студент готовится к решению типов задач профессиональной деятельности, предусмотренных ФГОС ВО и образовательной программой.

4. Объем дисциплины (модуля) и виды учебной работы

Период обучения	Общая трудоемкость (часы)	Общая трудоемкость (ЗЕТ)	Практические занятия (часы)	Самостоятельная работа (часы)	Промежуточная аттестация (часы)
3 семестр	72	2	36	36	Зачет
4 семестр	72	2	34	38	Зачет с оценкой
Всего	144	4	70	74	

5. Содержание дисциплины (модуля)

5.1. Разделы, темы дисциплины и виды занятий

(часы промежуточной аттестации не указываются)

			га	ы с

Наименование раздела, темы	Всего	Практические занятия	Самостоятельная работ	Планируемые результат обучения, соотнесенны результатами освоения программы
Раздел 1. Вводно-коррективный курс	**4**	**2**	**2**	УК-4.1 УК-4.2
Тема 1.1. Моя биография, семья	4	2	2	
Раздел 2. Общий курс иностранного языка	**20**	**10**	**10**	УК-4.1
Тема 2.1. Современная система образования в России, мой институт	4	2	2	
Тема 2.2. Проблемы экологии в современном мире.	4	2	2	
Тема 2.3. Страны изучаемого языка	4	2	2	
Тема 2.4. . Система высшего образования в США и Великобритании	4	2	2	
Тема 2.5. Россия в современном мире, Москва, мой родной город.	4	2	2	
Раздел 3. Профессионально-ориентированный иностранный язык	**120**	**58**	**62**	УК-4.1 УК-4.2 УК-4.3
Тема 3.1. Моя специальность: Современное состояние изучаемой науки, технологии.	48	24	24	
Тема 3.2. Моя специальность: История изучаемой науки и видные ученые	72	34	38	
Итого	**144**	**70**	**74**	

5.2. Содержание разделов, тем дисциплин и формы текущего контроля

Раздел 1. Вводно-коррективный курс

Тема 1.1. Моя биография, семья

Формирование коммуникативных компетенций по теме «Моя биография, семья».
Развитие у студентов учебно-познавательных и компенсаторных компетенций в рамках работы со словарями, учебными материалами, аудио и видео компонентами.
Развитие у студентов продуктивных навыков письма в формате изложения элементарной личной информации о себе, родственниках, друзьях и знакомых.
Развитие продуктивных навыков письма в формате написания коротких личных электронных писем и представления личной информации.
Грамматика: Личные и притяжательные местоимения. Способы образования множественного числа имен существительных, общий и притяжательный падежи. Степени сравнения прилагательных и наречий. Определенный и неопределенный артикль. Глагол to be. Времена группы Indefinite (Simple). Неправильные глаголы.

Раздел 2. Общий курс иностранного языка

Тема 2.1. Современная система образования в России, мой институт

Формирование у студентов гуманитарной личностной позиции и миропонимания.
Развитие навыков ознакомительного и изучающего чтения по теме «Современная система образования в России». Чтение и перевод текстов.
Грамматика: Числительные. Вспомогательные глаголы, глаголы-связки. Времена группы Continuous (Progressive). Времена группы Perfect

Тема 2.2. Проблемы экологии в современном мире.

Развитие навыков аудирования с пониманием основного содержания и выборочным извлечением информации на базе материалов «Проблемы экологии в современном мире.».
Развитие навыков изучающего чтения и монологической речи на базе тематически ориентированных материалов «Загрязнение окружающей среды, сохранение природных ресурсов, борьба с различными видами загрязнений, бережное отношение к природе».
Грамматика: Времена группы Perfect Continuous (Progressive). Фразовые глаголы. Типы предложений. Образование вопросительных и отрицательных предложений

Текущий контроль

Вид (форма) контроля
Контрольная работа

Тема 2.3. Страны изучаемого языка

Развитие навыков изучающего чтения и монологической речи (презентация) на базе тематически ориентированных материалов по теме «Страны изучаемого языка» (США, Великобритания: географическое положение, страноведческая характеристика)
Грамматика: Страдательный залог: образование и употребление. Особенности перевода страдательных оборотов на русский язык. Способы выражения будущего времени (going to)

Тема 2.4. . Система высшего образования в США и Великобритании

Формирование прагматических умений, включающих способность и готовность ориентироваться в незнакомой стране, устанавливать речевой контакт при путешествии, соблюдать социальные нормы и речевой этикет носителей языка.
Развитие навыков изучающего чтения и монологической речи (презентация) на базе тематически ориентированных материалов «Система высшего образования в США и Великобритании» (Система высшего образования. старейшие университеты США и Великобритании)
Грамматика: Модальные глаголы

Тема 2.5. Россия в современном мире, Москва, мой родной город.

Формирование системных и аналитических компетенций в рамках проведения комплексного анализа на базе изучения материала по теме «Россия в современном мире». (Географическое положение России, Москва – столица России, ее историческая значимость, мой родной город, его история, достопримечательности).
Грамматика: Прямая и косвенная речь, согласование времен. Будущее в прошедшем

Текущий контроль

Вид (форма) контроля
Контрольная работа

Раздел 3. Профессионально-ориентированный иностранный язык

Тема 3.1. Моя специальность: Современное состояние изучаемой науки, технологии.

ормирование коммуникативных и аналитических компетенций на базе освоения текстов по теме «История изучаемой науки и видные ученые».
Развитие у студентов профессионального мышления, умения анализировать и проектировать свое поведение и деятельность на практике через развитие навыков устной речи по профессионально ориентированной тематике «Развитие изучаемой отрасли науки, вклад ученых разных стран и России в ее развитие, основные достижения, наиболее значимые теории, применяемые в соответствующей отрасли науки».
Грамматика: Неличные формы глагола: инфинитив. Причастие, герундий. Причастие I и II (способы образования, функции в предложении). Независимый причастный оборот. Образование форм герундия, его свойства и функции в предложении, перевод.

Текущий контроль

Вид (форма) контроля
Контрольная работа

Тема 3.2. Моя специальность: История изучаемой науки и видные ученые

Формирование коммуникативных компетенций по теме «Современное состояние изучаемой науки, технологии».
Формирование навыков монологической речи по теме «Основные проблемы науки, различные технологии, применяемые в отрасли, их изменение и влияние на развитие отрасли и соответствующего направления в науке, эксперимент как проверка теории».
Развитие у студентов учебно-познавательных и компенсаторных компетенций в рамках работы со словарями, учебными материалами, аудио и видео компонентами; развития умений и навыков самостоятельного применения полученных знаний в поиске нужного материала, перевод индивидуальных текстов, подготовка рефератов, докладов и презентаций по заданной тематике.
Грамматика: усилительная конструкция it is … that, употребление used to и would для выражения повторяющихся действий в прошлом. Стилистические особенности речи. Аббревиатуры. Основные лексические различия британского и американского вариантов английского языка

Текущий контроль

Вид (форма) контроля
Контрольная работа

6. Порядок проведения промежуточной аттестации

Порядок проведения промежуточной аттестации регламентируется локальными нормативными актами Университета:
- Положением о формах, периодичности, порядке текущего контроля успеваемости и промежуточной аттестации обучающихся по основным образовательным программам высшего образования – программам бакалавриата, программам специалитета, программам магистратуры в федеральном государственном бюджетном образовательном учреждении высшего образования «Московский государственный университет геодезии и картографии», п.6 «Организация и проведение промежуточной аттестации».
- Положением о порядке осуществления образовательного процесса, проведения текущего контроля успеваемости и промежуточной аттестации обучающихся с применением электронного обучения и дистанционных образовательных технологий в федеральном государственном бюджетном образовательном учреждении высшего образования «Московский государственный университет геодезии и картографии», п.8 «Проведение промежуточной аттестации с применением ЭО и ДОТ».

Промежуточная аттестация: Зачет, 3 семестр.

Промежуточная аттестация: Зачет с оценкой, 4 семестр.

7. Оценочные материалы текущего контроля

Раздел 2. Общий курс иностранного языка
Контролируемые ИДК: УК-4.1

Тема 2.2. Проблемы экологии в современном мире.
Форма контроля/оценочное средство: Контрольная работа
Вопросы/Задания:
1. Переведите предложения на английский язык.
Мой дядя- ученый
2. Переведите предложения на английский язык.
Я родом из Бразилии.

3. Переведите предложения на английский язык.

Супермаркет находится недалеко от нашего дома.

4. Переведите предложения на английский язык.

Джон не был голоден.

5. Переведите предложения на английский язык.

Мы болеем.

6. Переведите предложения на английский язык.

Дети были в школе

7. Переведите предложения на английский язык.

Ключи будут на столе.

8. Переведите предложения на английский язык.

Билеты не будут дешевыми.

9. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

10. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

He (to work) every day

11. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

You (to play) soccer on Fridays?

12. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

Vegetables (to buy) by them every evening

13. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

The flowers (to water) by her every morning?

14. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

They (not to buy) anything two days ago

15. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

The car (to repair) yesterday by him

16. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

The shops (not to close) by them two days ago

17. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

They (not to read) tomorrow

18. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

The war (to stop) by them next year

19. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

They (to build) the bridge now

20. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

When I saw them, they (to walk) in the park

21. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

I just (to finish) my report

22. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

The work already (to do) by him

23. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

You (to invite) already by them?

24. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

By the time he got to the bus stop, the bus (to go) already

25. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

I (to finish) this work by next Friday

26. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

She (to listen to) music for two hours

27. Раскройте скобки, соблюдая правила построения утверждений, отрицаний и вопросов во всех временах и залогах в английском языке

The letter (to deliver) by next morning

Тема 2.5. Россия в современном мире, Москва, мой родной город.

Форма контроля/оценочное средство: Контрольная работа

Вопросы/Задания:

1. Answer the question:

What does the science of history of architecture study?

1. Architecture development process in connection with the biological processes
2. The relationship between people and animals
3. Architecture development process in connection with the historical processes

2. Choose the correct expression:

The detailed study of a site is

1. site analysis
2. bird analysis
3. cat analysis

3. Complete the sentence using the correct word:

_____ is your address?

1. What
2. How
3. That

4. Do you speak Japanese? No, I _____.

1. speaking not
2. speak not
3. don’t

5. Pick up the correct word:

a person or company, responsible for the physical construction of a building is _____

1. scientist
2. constructor
3. doctor

6. What do we call:

a thin tall structure usually rising above the castle or building that it is attached to?

1. tower
2. table
3. tree

7. When was the University of .Geodesy and Cartograpy founded?

1. 1779
2. 1920
3. 2000

8. What do modal verbs show?

1. modality
2. time
3. voice

9. Choose the correct sentence:

1. I am a student.
2. A student I am.
3. A student am I.

10. Раскройте скобки, употребляя глаголы в требующемся времени.

When I (to come) to Pete's house last Sunday, he (to read) a new book

11. Раскройте скобки, употребляя глаголы в требующемся времени.

Yesterday I (to buy) a new pair of gloves, as I (to lose) the old ones.

12. Раскройте скобки, употребляя глаголы в требующемся времени.

I (to meet) him when he (to walk) across the park.

13. Раскройте скобки, употребляя глаголы в требующемся времени.

Don't enter the bedroom! The child (to sleep) there, and he always (to wake) up when somebody (to open) the door.

14. Раскройте скобки, употребляя глаголы в требующемся времени.

What the children (to do) now? — Oh, they (to play) the new table game which I (to buy) for them the day before yesterday.

15. Раскройте скобки, употребляя глаголы в требующемся времени.

We could not go out because it (to rain) hard since early morning.

16. Раскройте скобки, употребляя глаголы в требующемся времени.

When I (to come) home yesterday, my sister already (to return) and (to sit) at the fireplace looking through some old photographs.

17. Раскройте скобки, употребляя глаголы в требующемся времени.

When morning came, the storm already (to stop), but the snow still (to fall).

18. Раскройте скобки, употребляя глаголы в требующемся времени.

I (to hear) this song several times already, but I cannot remember the words.

19. Передайте следующие предложения в Passive Voice.

I bought potatoes yesterday.

20. Передайте следующие предложения в Passive Voice.

We will bring the books tomorrow.

21. Передайте следующие предложения в Passive Voice.

They are repairing the clock now.

22. Передайте следующие предложения в Passive Voice.

I have translated the whole text.

23. Передайте следующие предложения в Passive Voice.

They broke the window last week

24. Передайте следующие предложения в Passive Voice.

They were playing tennis from four till five.

25. Передайте следующие предложения в Passive Voice.

By six o'clock they had finished the work.

26. Передайте следующие предложения в Passive Voice.

They are building a new concert-hall in our street.

27. Передайте следующие предложения в Passive Voice.

Livingstone explored Central Africa in the 19th century.

28. Передайте следующие предложения в Passive Voice.

They haven't brought back my skates.

29. Передайте предложения в косвенную речь.

“My friend lives in Moscow”, said Alec.

30. Передайте предложения в косвенную речь.

“I can’t explain this rule to you”’ said my classmate to me.

31. Передайте предложения в косвенную речь.

He said:” I have just received a letter from my uncle”

32. Передайте предложения в косвенную речь.

She asked me: ”What will you do tomorrow?”

33. Передайте предложения в косвенную речь.

She asked me:”Why did you come here yesterday?”

34. Передайте предложения в косвенную речь.

I asked me uncle: ”How long did you stay in Moscow?”

35. Передайте предложения в косвенную речь.

The teacher said to me:”Does your father work at a factory?”

36. Передайте предложения в косвенную речь.

“Did you go shopping yesterday?”, said grandmother to Mary

37. Передайте предложения в косвенную речь.

Father said to Nick:”Have you done your homework?”

38. Передайте предложения в косвенную речь.

“Tom, go to bed”, said his mother.

39. Передайте предложения в косвенную речь.

Kate said to her grandmother:”Help me to cook the soup, please”.

40. Передайте предложения в косвенную речь.

“Don’t play in the street”, said the van to the boys.

41. Составьте предложения с модальными глаголами, расставив слова в нужном порядке. Переведите получившиеся предложения.

the party / Linda / to / come / might / tonight.

42. Составьте предложения с модальными глаголами, расставив слова в нужном порядке. Переведите получившиеся предложения.

round / work / have to / farmers / the year / all.

43. Составьте предложения с модальными глаголами, расставив слова в нужном порядке. Переведите получившиеся предложения.

you / not / hospital / noise / must / make / in.

44. Составьте предложения с модальными глаголами, расставив слова в нужном порядке. Переведите получившиеся предложения.

the light / I / switch / may / on ?

45. Составьте предложения с модальными глаголами, расставив слова в нужном порядке. Переведите получившиеся предложения.

your / look / could / passport / I / at ?

46. Составьте предложения с модальными глаголами, расставив слова в нужном порядке. Переведите получившиеся предложения.

catch / last / able to / we / were / train / the.

47. Составьте предложения с модальными глаголами, расставив слова в нужном порядке. Переведите получившиеся предложения.

didn’t / you / drink / have to / much / yesterday / so.

48. Составьте предложения с модальными глаголами, расставив слова в нужном порядке. Переведите получившиеся предложения.

ought to / bill / Robert / the electricity / pay / today.

49. Составьте предложения с модальными глаголами, расставив слова в нужном порядке. Переведите получившиеся предложения.

better / we / find / a / should / job.

50. Составьте предложения с модальными глаголами, расставив слова в нужном порядке. Переведите получившиеся предложения.

too much / you / salt / and / eat / sugar / shouldn't.

Раздел 3. Профессионально-ориентированный иностранный язык

Контролируемые ИДК: УК-4.1 УК-4.2 УК-4.3

Тема 3.1. Моя специальность: Современное состояние изучаемой науки, технологии.

Форма контроля/оценочное средство: Контрольная работа

Вопросы/Задания:

1. Translate the text

A perfect example of renewable energy is energy from the sun, which comes in an abundant supply every day. Other examples of renewable sources of energy include the wind, the waves and tides, the gravitational pull of the earth, the heat at the earth's core (geothermal energy), landfill gases, and, to a limited degree, trees and plant material. Many of these renewable sources of energy can be used in their raw form. They are natural forces that create energy without the help of humans. All that is needed is for someone to decide how that energy can be used. Building a sail for a boat makes use of the wind. Building a waterwheel on a river makes use of the flowing water that is pulled downhill by the earth's gravity. Building a house out of glass-a greenhouse-traps the heat from sunlight inside, providing warmth and allowing plants to grow where they might not otherwise grow.

Renewable energy, also called "green energy," or "clean energy," does not deplete natural resources and creates little-to-no pollution when it is generated. The unique challenge of today is finding a way to supply renewable energy to entire populations. Large-scale energy production requires specialized equipment such as energy storage and transmission facilities. Many experts agree that renewable energy would provide numerous benefits. Because renewables do not use fossil fuels (most are entirely fuel-free) they are largely immune to the threat of future oil or gas shortages and fossil fuel price hikes. For the same reason, because most renewable technologies require no combustion, they are far kinder to the environment than coal, oil, and natural gas. Smog and acid rain could be eliminated with renewables. In addition to being virtually nonpolluting, renewable energy is thought to be cheaper for producers and consumers.

As the resources of the planet are used faster than they are replaced, people are turning to solar, wind, hydro, and geothermal energy to meet their energy needs. Supporting the use of energy sources that are replenished as fast, or faster, than they are used is helping to create a sustainable energy future. For such changes to happen effectively, however, it will take changes in government policies, more economic support for alternative energy producers, and individual consumers demanding a different choice. These factors will determine the direction of energy production in the coming decades.

Тема 3.2. Моя специальность: История изучаемой науки и видные ученые

Форма контроля/оценочное средство: Контрольная работа

Вопросы/Задания:

1. Translate the text

Translate the following text:

All living systems require energy to survive. A person requires energy in the form of food. A plant requires energy in the form of sunlight. All mechanical systems also require energy to function. A car needs gasoline to run.

A sailboat needs wind to move across the water. Energy, in one form or another, is needed for all living and nonliving activity on the planet. Energy does not actually exist as a thing itself, however. Instead, energy is an idea describing various sources of power. Long ago, humans relied upon the

natural systems of the earth to meet their energy needs. Cliff dwellers of the Southwest built their homes to capture the heat of winter sunlight. Ancient Greeks bathed in water warmed by geothermal vents. Humans around the world used wood to cook their meals and warm their homes. The natural systems of the planet met all of these needs.

The pursuit of more powerful and consistent energy sources came about during the Industrial Revolution, which began in the late eighteenth century and continued through the beginning of the nineteenth century. For the first time, humans began burning fossil fuels in great quantities to meet their energy needs. Fossil fuels powered the factories they worked in, the farm equipment needed to produce large crops, and eventually, the cars they drove. It seemed as if fossil fuels were the perfect answer to the need for a quick and efficient form of energy.

It was not until the 1970s that serious problems from the use of fossil fuels began to be recognized. Oil-producing countries began to demand more money for their product. Oil-consuming countries, such as the United States, refused to accept these higher costs. Many countries put oil embargoes into place. This drove the cost of fossil fuels higher and higher. This series of events led to an energy crisis. People began to wonder what they would do if the cost of fossil fuels did not decline and, consequently, an interest in alternative energy sources began to develop.

Also, since the energy crisis of the 1970s, scientists have learned more about the environmental impact of fossil fuels. They have linked acid rain to the sulfur dioxide released when fossil fuels are burned. Burning fossil fuels also releases large quantities of carbon dioxide.

8. Оценочные материалы промежуточной аттестации

3 семестр, Зачет

Контролируемые ИДК: УК-4.1 УК-4.2 УК-4.3

Вопросы/Задания:

1. Tell about

Higher education in Russia

2. Tell about

Higher education in the UK and in the USA

3. Tell about

London, its history and development

4. Tell about

the probkem of pollution and ecology

5. Tell about

the environment protection

6. Tell about

your native town and your favourite places of interest in Moscow

7. Tell about

ecological problems of big cities

8. Tell about

non-traditional renewable sources of energy

9. Tell about

the latest advancements in technology

10. Tell about

your career choice

4 семестр, Зачет с оценкой

Контролируемые ИДК: УК-4.1 УК-4.2 УК-4.3

Вопросы/Задания:

1. Answer the question:

What is soil pollution?

2. Answer the question:

What defines a renewable energy source?

3. Answer the question:

Can wind turbines negatively impact wildlife?

4. Answer the question:

Are there notable regions where renewable/alternative energy sources are consistently utilized?

5. Answer the question:

How is ecology defined as "the economy of nature"?

6. Answer the question:

Can soil pollution be remediated, and if so, how?

7. Answer the question:

Does industrialization improve water quality?

8. Answer the question:

What is termed "green energy" or "clean energy"?

9. Answer the question:

What major differences exist between non-renewable and renewable/alternative energy sources?

10. Answer the question:

What defines a non-renewable energy source?

11. Answer the question:

What key international documents address ecological preservation?

12. Answer the question:

What is the concept of a circular economy?

13. Answer the question:

Does overexploitation of resources lead to depletion or restoration?

14. Answer the question:

What categories of pollution are recognized?

15. Answer the question:

Which two fundamental components constitute an ecosystem?

16. Answer the question:

What is biodiversity, and what are its three constituent levels?

17. Answer the question:

What three essential natural cycles are you familiar with?

18. Look through the text and give its main idea:

The greenhouse effect is one of several factors that affect the temperature of the Earth. It was discovered by Joseph Fourier in 1824, with the first reliable experiments conducted by John Tyndall in the year 1858 and reported for the first time, quantitatively by Svante Arrhenius in 1896. Greenhouse gases, which include water vapour, carbon dioxide and methane, warm the atmosphere by efficiently absorbing thermal infrared radiation emitted by the Earth surface, by the atmosphere itself, and by clouds. Methane is produced when vegetation is burned, digested or rotted with no oxygen present. Garbage dumps, rice pad-dies, and grazing cows and other livestock release lots of methane. Nitrous oxide can be found naturally in the environment but human activities are increasing the amounts. Nitrous oxide is released when chemical fertilizers and manure are used in agriculture. Halocarbons are a family of chemicals that include CFCs (which also damage the ozone layer), and other human-made chemicals that contain chlorine and fluorine. The most poisonous and the abundantly released gas is carbon dioxide. Billions of tones of carbon dioxide are burnt into the atmosphere every year. Carbon dioxide is the gas that is exhaled by everyone in this Earth and it has the properties to absorb infrared radiation, which is the heat radiated away from a warm object. The Earth cools off at night by radiating the heat back into the space, which it gets from the sun during the day, in the form of infrared radiation. With carbon dioxide present in the air, it will absorb some of the radiation and limit its exit into space. The presence of increased carbon in the atmosphere has

made the oceans more acidic, killing many sea creatures and endangering the general health of the oceans all over the world.

19. Look through the text and give its main idea:

HOW TO SAVE THE PLANET AND HUMANITY

Let's face reality. The Earth is going to be the first planet terraformed. The human race is killing our planet by flooding land, sea, and air with pollution and by over use. Plants and animals are unable to adapt quickly enough to the changes in the environment that mankind is causing. The Earth is becoming less capable of sustaining the world's population. Even humanity is at risk of becoming extinct because of the long term effects of global warming. Here are some recommendations of what has to be done to save both the planet and humanity.

Recycle everything! Instead of having our trash sent to landfills, everything that people consume and eventually throw out must be recycled. Therefore, we need recycling plants for batteries, electronics, organic (food and garden) wastes, medals, etc. in addition to recycling paper, plastic, glass, and aluminum.

Pollution Free Energy! Reducing energy utilization, such as energy efficient light bulbs, cars, and washing machines will not solve this problem; but only delay this problem from being solved as soon as possible.

Population Control. Right now, the Earth cannot sustain the existing human population indefinitely, and this is not including the current population growth. As a result, the world's resources are quickly dwindling without replacements. The only logical solution to this problem is population control. Since the world cannot indefinitely support the entire human population, then the world's population needs to decrease to a level so that the planet can sustain both humanity and wildlife indefinitely.

Renewable Resources. Humanity is currently consuming more resources than the planet can renew, and this does not include non-renewable resources such as oil. Therefore, business will eventually have to convert to strictly self sustainable and renewable resources in the near future.

20. Look through the text and give its main idea:

Environmental Protection. The human race is destroying vast regions of the planet, so much so that the planet's ability of supporting life is decreasing. Throughout the world, forests and wild lands must no longer be allowed to be destroyed for human development, and this still may not be enough to support all wildlife. Land that has become infertile because of man's actions, such as strip mining and deforestation, must be revived by law. The world's oceans also need to be globally managed, since the world's fish population is suffering from overfishing. It is estimated that the world's oceans will no longer be commercially useful for fishing between 2030 and 2060. Even air pollution needs to be completely regulated until all air is clean and remains that way.

Manage Global Warming. Global warming is going to decimate the human civilization if left unchecked. Further actions must be necessary to either prevent or manage global warming. For instance, intentionally flood large portions of land to prevent the world's ocean from destroying coastal cities and farmland, redirect rivers to not deposit their water into the oceans but
into lakes, valleys, canyons, aquifers, empty oil fields, and where ever else possible, use seawater to flood large sections of unused land, such as deserts. These solutions will definitely have major consequences, but will not include the uncontrolled destruction of cities and countless lives.

21. Look through the text and give its main idea:

The main reason why consumers mostly buy non-recycled goods is be-cause these goods are cheaper than recycled goods. This may be obvious to most people, but few people realize that this fact is a problem that can be solved. A simple yet practical solution for this problem is to heavily tax non-recycled goods, and use the money collected to subsidize recycled goods.

This would have two major benefits. First, the plundering and looting that is destroying the environment should decrease substantially and maybe one day even stop. Second, this would drastically increase the amount of recycling. Therefore, the economy of scale of recycling will also dramatically increase, thus the cost of recycling will significantly decrease. Eventually, the cost of

recycling without subsidies should decrease to below the cost of using non-recycled resources that are untaxed. Once this has been achieved, then the taxes on non-recycled resources can be stopped.
Similarly, environmentally unfriendly energy sources are currently much more cost effective than environmentally friendly and renewable sources of energy. If the cost of environmentally unfriendly energy sources were to be artificially more than the alternatives, then eco-friendly energy sources would become much more popular. Eventually, the large scale demand and utilization of these environmentally friendly energy sources should decrease the cost of renewable energy to below the current costs of environmentally harmful power sources. Again once the cost of using eco-friendly power sources become truly cost effective on a large scale, then the taxes on unfriendly power sources can be removed too.
In essence, this simple solution would protect the environment by giving bigger incentives to recycle everything and to use environmentally friendly power sources. Unfortunately, it is now necessary for the environment to come first, and profits for large corporations to come second. Keep in mind that corporations will still make profits during this eco-friendly transition period, and corporations will resume making ridiculously huge profits in the new eco-friendly business environment. Therefore, let the new world mantra be “The environment first, profits second! ”

22. Look through the text and give its main idea:

Scientists have estimated that every day, an average person inhales about 20,000 liters of air. Every time we breathe, we risk inhaling dangerous chemicals that have found their way into the air. Air pollution includes all contaminants found in the atmosphere. These dangerous substances can be either in the form of gases or particles. Air pollution can be found both outdoors and indoors. Pollutants can be trapped inside buildings, causing indoor pollution that lasts for a long time. The sources of air pollution are both natural and human-based. As one might expect, humans have been producing increasing amounts of pollutants as time has progressed, and they now account for the majority of pollutants released into the air.
The effects of air pollution are diverse and numerous. Air pollution can have serious consequences for the health of human beings, and also severely affects natural ecosystems. Because it is located in the atmosphere, air pollution is able to travel far off places easily. As a result, air pollution is a global problem and has been the subject of both global cooperation and conflict. Some areas now suffer more than others from air pollution. Cities with large numbers of automobiles or those that use great quantities of coal often suffer most severely from problems of air pollution.
Historically, air pollution comes from industries and transport. Factories, power stations and cars burn oil and coal. This rises into the air as different forms of sulphur and nitrogen. The sulphur and nitrogen combine with water in the air to make sulphuric or nitric acid. This falls to the ground as acid rain.
We burn large quantities of coal and oil, and this creates millions of tonnes of acid rain. The wind carries the rain long distances, and this creates problems. One country makes acid rain, and it falls to the ground in another country, for example, Canada gets a lot of acid rain from the USA, and Norway gets a lot of acid rain from Britain.

23. Look through the text and give its main idea:

Industrial countries also cause the greenhouse effect as you know. Burning coal and oil produces carbon dioxide (CO2). The CO2 increases in the Earth’s atmosphere, and retains heat from the sun (it works like the glass in a greenhouse - it lets heat in, but doesn’t let the heat out).
The Earth is getting hotter. Weather patterns are changing: some places have no water for years, and some places have floods. When a country has no water, the effects are very hard - in Chile in 1999, the result was electricity cuts around the country. There was no either water for the hydroelectric power stations. The ozone layer is a band of gas around the Earth. It protects us from dangerous ultraviolet (UV) radiation from the sun. It is vital to human and animal survival.
Unfortunately, we are producing chemicals which destroy the ozone layer. The damage starts in the Antarctic and spreads. Sheep in the Magallanes are becoming blind because the ozone layer is thinner. In Australia, a lot of people are getting skin cancer from the sun.
Output control, the opposite method, seeks to fix the problems caused by air pollution. This usually

means cleaning up an area that has been damaged by pollution. Input controls are usually more effective than output controls. Output controls are also more expensive, making them less desirable to tax payers and polluting industries. Current air pollution control efforts are not all highly effective. However, in developing countries and even in countries where pollution is strictly regulated, much more needs to be done.

24. Look through the text and give its main idea:

Water covers over 70% of the Earth's surface and is very important resource for people and the environment. Water pollution affects water, rivers, lakes and oceans all over the world. This consequently harms human health and the natural environment. Here you can find out more about water pollution and what you can do to prevent it.

Sewage is the term used for wastewater that often contains faeces, urine and laundry waste. There are billions of people on Earth, so treating sewage is a big priority. Sewage disposal is a major problem in developing countries as many people in these areas don't have access to sanitary conditions and clean water. Untreated sewage water in such areas can contaminate the environment and cause diseases such as diarrhea. Sewage in developed countries is carried away from the home quickly and hygienically through sewage pipes. Sewage is also treated in water treatment plants and the waste is often disposed into the sea. It is mainly biodegradable and most of it is broken down in the environment. In developed countries, sewage often causes problems when people flush chemical and pharmaceutical substances down the toilet. Moreover, when people are ill, sewage often carries harmful viruses and bacteria into the environment causing health problems.

Sewage can cause huge problems. Litter items such as 6-pack ring packaging can get caught in marine animals and may result in death. Different items take different lengths of time to degrade in water:

It takes cardboard 2 weeks to degrade; newspaper, photodegradable packaging - 6 weeks; foam - 50 years; styrofoam - 80 years; aluminium - 200 years; plastic packaging - 400 years; glass - it takes so long to degrade that we don't know the exact time.

Industry is a huge source of water pollution, it produces pollutants that are extremely harmful to people Industry is a huge source of water pollution, it produces pollutants that are extremely harmful to people and the environment. Many industrial facilities use freshwater to carry away waste from the plant and into rivers, lakes and oceans. Briefly, pollutants from industrial sources include a lot of things: asbestos, lead, mercury, nitrates, phosphates and many others.

25. Look through the text and give its main idea:

Fertilizers are often used in farming, sometimes these fertilizers run-off into nearby water causing an increase in nutrient levels. This causes phytoplankton to grow and reproduce more rapidly, resulting in algal blooms. This bloom of algae block sunlight from photosynthetic marine plants under the water surface and disrupts normal ecosystem functioning and causes many problems. The algae may use up all the oxygen in the water, leaving none for other marine life. This results in the death of many aquatic organisms such as fish, which need the oxygen in the water to live.

The various processes for treating polluted water are industrial water treatment, denitrification, septic tanks and ozone waste water treatment.

Before raw sewage can be safely released back into the environment, it needs to be treated correctly in a water treatment plant. In a water treatment plant, sewage goes through a number of chambers and chemical processes to reduce the amount and toxicity of the waste. The sewage first goes through a primary phase. This is where some of the suspended, solid particles and inorganic material is removed by the use of filters. The secondary phase of the treatment involves the reduction of organic, this is done with the use of biological filters and processes that naturally degrade the organic waste material. The final stage of treatment is the tertiary phase; this stage must be done before the water can be reused. Almost all solid particles are removed from the water and chemical additives are supplied to get rid of any left-over impurities.

is an ecological approach that can be used to prevent the leaching of nitrates in soil, this in turn stops any ground water from being contaminated with nutrients. Fertilizers contain nitrogen, and are often applied to crops by farmers to help plant growth and increase the yield. Bacteria in the soil convert

the nitrogen in the fertilizer to nitrates, making it easier for the plants to absorb. Immobilization is a process where the nitrates become part of the soil organic matter. When oxygen levels are low, another form of bacteria then turns the nitrates into gases such as nitrogen, nitrous oxide and nitrogen dioxide. The conversion of these nitrates into gas is called denitrification. This prevents nitrates from leaching into the soil and contaminating groundwater.

26. Look through the text and give its main idea:

Photovoltaics (PV) is a method of generating electrical power by con-verting solar radiation intodirect current electricity using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels composed of a number of cells containing a photovoltaic ma¬terial. Materials presently used for photovoltaics include monocrystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide/sulfide. Due to the growing demand for renewable energy sources, the manufacturing of solar cells and photovoltaic arrays has advanced considerably in recent years.

Driven by advances in technology and increases in manufacturing scale and sophistication, the cost of photovoltaics has declined steadily since the first solar cells were manufactured. Net metering and financial incentives, such as preferential feed-in tariffs for solar-generated electricity, have sup¬ported solar PV installations in many countries. The photovoltaic effect was first observed by Alexandre-Edmond Becquerel in 1839.

27. Look through the text and give its main idea:

Neutrons in motion are the starting point for everything that happens in a nuclear reactor. When a neutron passes near to a heavy nucleus, for example uranium-235 (U-235), the neutron may be captured by the nucleus and this may or may not be followed by fission. Capture involves the addition of the neutron to the uranium nucleus to form a new compound nucleus. A simple example is U-238 + n ==> U-239, which represents formation of the nucleus U-239. The new nucleus may decay into a different nuclide. In this example, U-239 becomes Np-239 after emission of a beta particle (electron). But in certain cases the initial capture is rapidly followed by the fission of the new nucleus. Whether fission takes place, and indeed whether capture occurs at all, depends on the velocity of the passing neutron and on the particular heavy nucleus involved.

Fission may take place in any of the heavy nuclei after capture of a neutron. However, low-energy (slow or thermal) neutrons are able to cause fission only in those isotopes of uranium and plutonium whose nuclei contain odd numbers of neutrons (e.g. U-233, U-235, and Pu-239). Thermal fission may also occur in some other transuranic elements whose nuclei contain odd numbers of neutrons. For nuclei containing an even number of neutrons, fission can only occur if the incident neutrons have energy above about one million electron volts (MeV).

28. Look through the text and give its main idea:

Protected Areas: Sanctuaries of Life – A Case Study of Yellowstone National Park

Protected areas—designated regions managed to conserve biodiversity, ecosystems, and cultural heritage—stand as humanity's most deliberate commitment to preserving nature. From strict nature reserves to community-managed landscapes, these spaces shield fragile species, sustain ecological processes, and offer vital refuge in an increasingly fragmented world. Yet their success hinges not merely on legal designation but on adaptive management that addresses evolving threats. The story of Yellowstone National Park, established in 1872 as the world's first national park, reveals both the transformative power and complex challenges of protected areas.

Yellowstone: A Living Laboratory

Spanning 2.2 million acres across Wyoming, Montana, and Idaho, Yellowstone safeguards a volcanic landscape of geysers, forests, rivers, and alpine meadows. Its creation halted the rampant exploitation of the American West, preserving habitats for iconic species: grizzly bears, bison, gray wolves, and herds of elk. Crucially, Yellowstone became a proving ground for ecological restoration. By the mid-20th century, predator eradication campaigns had eliminated wolves, triggering a trophic cascade: exploding elk populations overgrazed aspen and willow, leading to soil erosion, riverbank collapse, and declining bird diversity.

The Wolf Reintroduction: Rewilding Balance

In 1995, after decades of scientific advocacy, 14 gray wolves were reintroduced to Yellowstone—a landmark experiment in restoring ecological integrity. The wolves' return realigned the park's food web. Elk populations stabilized, reducing grazing pressure. Willows and aspens rebounded, stabilizing riverbanks and creating habitat for beavers. Beaver ponds nurtured fish, amphibians, and insects. Scavengers like eagles and ravens flourished on wolf kills. This "ecology of fear" even altered elk behavior, allowing vegetation recovery in riparian zones. The wolves became a global symbol of how keystone species sustain ecosystem health.

Persistent Challenges: Beyond Boundaries

Yellowstone's triumphs coexist with ongoing threats:

- Climate Change: Warming temperatures reduce snowpack, stressing cold-water fish like cutthroat trout. Longer fire seasons increase wildfire risks.
- Human Pressures: Over 4 million annual visitors cause habitat fragmentation, wildlife displacement, and invasive species introduction.
- Boundary Conflicts: Migratory species like bison and pronghorn face barriers when leaving the park. Bison venturing into Montana are culled to prevent livestock disease spread, igniting legal battles.
- Invasive Species: Non-native lake trout devastate native fisheries, requiring costly removal efforts.

Adaptive Management & Lessons for the World

Yellowstone's managers employ science-driven strategies:

- Ecological Fire Management: Allowing natural fires to renew forests while protecting human infrastructure.
- Collaborative Governance: Partnering with tribal nations (like the Nez Perce) on bison conservation and restoring cultural burning practices.
- Landscape Connectivity: Advocating for wildlife corridors beyond park borders, such as the Yellowstone to Yukon Initiative.
- Visitor Education: Using permit systems and "Leave No Trace" campaigns to minimize impact.

Global Legacy

Yellowstone proved that protected areas can reverse ecological damage—but their future requires transcending isolation. As climate change reshapes habitats and species ranges, static park boundaries become insufficient. Yellowstone's lessons underscore that effective protection demands:

- Connectivity: Linking protected zones through wildlife corridors.
- Community Integration: Honoring Indigenous stewardship and local partnerships.
- Adaptive Foresight: Preparing for novel ecosystems shaped by warming.
- Holistic Valuation: Recognizing that protected areas provide not just biodiversity refuge but carbon storage, water filtration, and resilience against disasters.

Yellowstone remains a beacon: a testament to nature's capacity to heal when given sanctuary, and a reminder that true protection is a dynamic pact between humans and the wild.

29. Look through the text and give its main idea:

. Wildlife Reserves: Arks of Survival – A Case Study of the Serengeti National Park

Wildlife reserves—protected areas specifically designed to conserve animal species and their habitats—serve as critical refuges in a world where 60% of wildlife populations have vanished since 1970. Unlike multi-use parks, reserves often prioritize strict habitat integrity and species protection, creating sanctuaries where ecological processes can unfold with minimal human interference. Yet their effectiveness hinges on balancing conservation with complex socio-economic realities. Serengeti National Park, Tanzania's 14,750 km² crown jewel, exemplifies both the triumphs and tensions inherent in wildlife reserve management.

The Serengeti: An Ecological Masterpiece

Designated a reserve in 1929 and upgraded to a national park in 1951, the Serengeti protects Earth's last great terrestrial mammal migration. Each year, 1.5 million wildebeest, 400,000 zebra, and

200,000 gazelles traverse its grasslands and woodlands in a 1,000-km circuit driven by rains. This ancient rhythm sustains apex predators: lions, cheetahs, and hyenas. The ecosystem's health relies on keystone dynamics—grazers maintain grassland structure, preventing woodland encroachment, while carcasses nourish scavengers and soil. Crucially, the reserve anchors a larger *Serengeti Ecosystem* (30,000 km²), including buffer zones and Kenya's Maasai Mara Reserve.

Conservation Successes: The Wildebeest Effect

Strict anti-poaching patrols and habitat management reversed near-collapse:

- Poaching Control: Rhino populations were decimated (from 1,000 to near zero by 1980). Intensive ranger deployment (using aerial surveillance and canine units) reduced poaching by 90%, allowing black rhinos to slowly recover.
- Fire Management: Controlled burns mimic natural cycles, rejuvenating grasslands for grazers.
- Migration Protection: Banning fences and roads along migration corridors ensured the wildebeest cycle persisted—now generating $150 million annually in tourism revenue.

Emerging Threats: Pressures Beyond Boundaries

Despite successes, the Serengeti faces escalating challenges:

- Climate Disruption: Unpredictable rainfall alters migration timing. Droughts (2023) caused mass wildebeest die-offs, while intense rains spread bovine diseases.
- Human-Wildlife Conflict: Villages bordering the park experience crop raiding by elephants and predation on livestock. Retaliatory killings threaten lions and hyenas.
- Infrastructure Intrusion: A proposed highway (2010) across the northern migration route risked fragmenting the ecosystem. Global outcry halted it, but pressure for roads and pipelines persists.
- Tourism Impacts: Over 350,000 annual visitors cause soil compaction, noise pollution, and wildlife stress. Luxury lodges drain scarce water resources.

Adaptive Strategies: Coexistence and Connectivity

Serengeti managers deploy innovative solutions:

- Community Engagement: The Serengeti District Conservation Project shares tourism revenue with villages. Maasai scouts join anti-poaching units, while beehive fences deter elephants from farms.
- Transboundary Collaboration: Joint patrols with Kenya's Maasai Mara prevent poachers exploiting border gaps. Satellite collars track migration shifts, informing adaptive management.
- Climate Resilience: Artificial water points mitigate drought impacts, while veterinary programs vaccinate wildlife against new diseases.
- Sustainable Tourism: Limits on vehicle numbers, seasonal route closures, and eco-lodge certification reduce footprint.

Global Lessons from the Savanna

The Serengeti reveals core principles for effective reserves:

1. Scale Matters: Isolated reserves fail. Serengeti's connectivity to Mara and Ngorongoro is non-negotiable for migratory survival.
2. Communities as Custodians: Conservation fails without local buy-in. Revenue-sharing turns poachers into protectors.
3. Climate Adaptation is Non-Optional: Reserves must anticipate ecological shifts—managing for dynamism, not stasis.
4. Economic Value Drives Protection: Tourism revenue ($1 billion/year for Tanzania) justifies conservation investment politically.

The Unfinished Legacy

Poaching still claims 150,000 Serengeti animals yearly. Climate models predict biome shifts that could displace grazers by 2050. Yet, the reserve endures as a testament to nature's resilience when given space. As human pressures mount, the Serengeti's greatest lesson is clear: wildlife reserves are not just enclosures but living tapestries woven into ecological, economic, and cultural landscapes. Their survival depends on weaving conservation into the fabric of human progress.

30. Look through the text and give its main idea:

The Paris Climate Accord: Humanity's Pact for a Livable Future

Signed in 2015 under the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement represents a historic turning point in global environmental governance.

Unanimously adopted by 196 nations, it is the first universal pact mandating collective action to confront climate change. Unlike its predecessor, the Kyoto Protocol—which imposed binding emissions cuts only on developed nations—Paris embraces *universal but differentiated responsibility*, acknowledging that all countries must contribute while respecting their unique capacities and historical contexts. Its core ambition is unequivocal: hold global temperature rise "well below 2°C" above pre-industrial levels while "pursuing efforts" to cap warming at 1.5°C. This distinction matters profoundly—a half-degree less warming could spare hundreds of millions from climate-induced poverty, drought, and displacement.

Architecture of Accountability: Flexibility Meets Rigor

The agreement's genius lies in its hybrid structure, balancing sovereignty with collective oversight. Each nation submits self-determined Nationally Determined Contributions (NDCs)—detailed climate action plans outlining emissions targets, adaptation strategies, and financing needs. These pledges are not legally binding but operate under a "name-and-encourage" system: every five years, nations must revise their NDCs with increased ambition, informed by a Global Stocktake assessing collective progress. The first stocktake (2023) exposed a glaring gap—current pledges put Earth on track for 2.5°C of warming, necessitating far steeper emissions cuts. To support vulnerable nations, the accord institutionalizes climate finance, mandating developed countries to mobilize $100 billion annually by 2020 (a target finally met in 2022) for mitigation and adaptation in the Global South. This funding recognizes that climate justice requires redistributing resources to those least responsible yet most impacted.

Tensions and Triumphs in Implementation

The accord thrives on diplomacy but faces real-world friction. Equity debates simmer: emerging economies like India demand "carbon space" to develop, while small island states (e.g., Tuvalu) insist on rapid decarbonization to avoid existential threats. Transparency frameworks struggle with inconsistent reporting—some nations lack technical capacity, others political will. The U.S. withdrawal in 2020 under President Trump (reversed by Biden in 2021) revealed geopolitical fragility. Yet Paris endures, evolving through annual COP summits:

- COP26 (Glasgow, 2021): Secured pledges to "phase down" coal and slash methane emissions.
- COP27 (Sharm el-Sheikh, 2022): Established a "loss and damage" fund for climate disasters.
- COP28 (Dubai, 2023): Marked the beginning of the end for fossil fuels with a call to "transition away" from oil and gas.

Beyond Emissions: A Holistic Vision

Paris recognizes climate change as interwoven with biodiversity loss, poverty, and inequality. Its framework promotes nature-based solutions—protecting forests as carbon sinks, restoring wetlands for flood resilience—and links climate action with sustainable development. Indigenous knowledge is formally acknowledged as vital for ecosystem stewardship. Critically, the accord empowers non-state actors: cities, corporations, and NGOs now drive innovation, from renewable energy investments to supply-chain decarbonization.

The Road Ahead

Despite progress, current efforts remain insufficient. Meeting the 1.5°C goal demands *halving global emissions by 2030*—requiring unprecedented scaling of renewables, electrification, and land restoration. The 2024 NDC updates will test nations' willingness to prioritize survival over short-term interests. Paris' legacy hinges on transforming its aspirational scaffolding into concrete, just action. It remains our best mechanism to forge a future where humans and ecosystems thrive together—a testament to what's possible when the world chooses unity over division.

Key innovations embedded:

- Ratchet Mechanism: Progressive NDC enhancements
- Global Stocktake: Science-driven accountability
- Article 6: Carbon market rules to prevent double-counting
- Adaptation Communication: Standardizing vulnerability reporting

31. Look through the text and give its main idea:

The Plunder of the Deep: Unsustainable Fishing and the Case of the Patagonian Toothfish

Unsustainable fishing—extracting marine life beyond reproductive capacity while destroying

habitats—has pushed global fisheries to the brink. Nowhere is this crisis more starkly illustrated than in the saga of the “Patagonian toothfish” (*клыкач патагонский - Dissostichus eleginoides*), a deep-sea predator whose fate reveals the lethal intersection of greed, ecological ignorance, and regulatory failure.

The "White Gold" Rush

Discovered in the cold, remote waters near Antarctica in the 1980s, the toothfish (marketed as "Chilean sea bass"- морской окунь) became an instant luxury commodity. Its flaky, oily flesh commanded $25/kg in U.S. sushi markets. By the 1990s, industrial plunder began: factory trawlers from Spain, Russia, and Chile descended on sub-Antarctic shelves, deploying 10-km longlines with 30,000 baited hooks. Lacking regulation, vessels ignored size limits and seasons, extracting 100,000 tons annually—five times sustainable levels. The toothfish’s biology made it vulnerable: slow-growing (reaching maturity at 10-13 years), it couldn’t replenish under such assault.

Ecological Carnage

The collateral damage was catastrophic:

- Bycatch: For every ton of toothfish landed, 1.5 tons of albatrosses, petrels, and seals drowned on hooks. Endangered wandering albatross populations plummeted 30%.
- Habitat Destruction: Bottom trawlers crushed fragile cold-water corals, sponges, and seamounts—biodiversity hotspots requiring centuries to recover.
- Illegal, Unreported, and Unregulated (IUU) Fishing: Vessels flew flags of convenience (Belize, Panama), disabled tracking systems, and laundered catches through Mauritius. At its peak, IUU fishing accounted for 50% of total toothfish harvest.

By 2000, toothfish stocks collapsed by 80% in key zones like Heard Island. The Southern Ocean ecosystem unraveled: orcas shifted to preying on seals deprived of fish, while toothfish-dependent colossal squid declined.

Turning the Tide: The Fight for Accountability

Salvation emerged through unprecedented cooperation:

1. Diplomatic Pressure: The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) mandated satellite monitoring and banned toothfish fishing in 1.9 million km² of vulnerable seabed.
2. Traceability Tech: The "CDS" (Catch Documentation Scheme) tracked fish from hook to port, exposing illegal shipments. U.S. chefs like Eric Ripert boycotted unverified sellers.
3. Market Transformation: MSC certification (Marine Stewardship Council) rewarded sustainable fishers. Chilean fleets adopted pallar trawls to reduce bycatch, while seabird-scaring lines cut albatross deaths by 99%.
4. Naval Enforcement: Australia and South Africa sank illegal vessels like the *Viarsa 1* after 21-day chases.

Lessons from the Abyss

The toothfish recovery—now 60% rebuilt in managed zones—offers a blueprint:

- Remote ecosystems are not immune: Globalization enables exploitation anywhere.
- IUU fishing thrives in governance voids: Only coordinated global policing works.
- Consumer power drives change: Ethical sourcing demands reshaped markets.
- Slow-growing species need radical protection: Single-species quotas ignore ecosystem impacts.

Yet threats persist: climate change warms Antarctic waters, altering toothfish prey, while pirate fleets now target adjacent species like mackerel icefish. The toothfish remains a symbol—both of ocean fragility and humanity’s capacity to correct course when science, policy, and ethics align.

> *"We almost sacrificed an entire ecosystem for a luxury fish. The lesson? Sustainability must outswim profit."* — *Dr. Andrea Kavanagh, Pew Charitable Trusts Antarctic Conservation.

32. Look through the text and give its main idea:

. Solar, Wind, and Hydropower: Liberating Energy Systems from Fossil Fuel Dependence

Solar, wind, and hydropower form the cornerstone of a global energy revolution, actively displacing fossil fuels by harnessing Earth’s natural energy flows. Unlike finite coal, oil, and gas—whose extraction ravages landscapes, emits planet-warming gases, and triggers geopolitical strife—these renewable sources convert abundant sunlight, air currents, and water cycles into clean electricity.

Their collective deployment is dismantling the fossil fuel monopoly, offering a path toward energy independence and ecological renewal.
Solar power captures the sun's inexhaustible energy through photovoltaic panels and concentrated solar plants. From rooftop installations empowering homes to vast solar farms repurposing degraded lands, it generates electricity without smoke or mine pits. In sun-rich regions like Rajasthan or Nevada, solar outcompetes coal on price alone. Crucially, solar decentralizes energy access: remote clinics in Malawi refrigerate vaccines using solar microgrids, bypassing diesel generators. Every megawatt-hour of solar power prevents ~0.7 tons of CO_2 emissions from coal plants while eliminating mercury, sulfur dioxide, and particulate pollution.
Wind energy converts atmospheric movement into power via onshore turbines and offshore arrays. Wind farms now operate from Texas prairies to North Sea shallows, their turbines feeding grids once dominated by gas. Modern designs capture energy even at low wind speeds, and "hybrid" projects pair turbines with solar panels for round-the-clock generation. Offshore wind, with its stronger, steadier currents, avoids land-use conflicts—floating platforms unlock deep-water potential. Wind's scalability is profound: a single rotation of a 15 MW turbine powers a household for days. By displacing gas-fired electricity, wind avoids not only CO_2 but methane leaks—a potent short-term climate driver.
Hydropower leverages gravity and water cycles, channeling rivers or tidal forces through turbines. While large dams (like China's Three Gorges) generate massive output, "run-of-river" systems minimize ecosystem disruption. Pumped hydro storage acts as a giant battery, storing excess solar/wind energy by moving water uphill for later release. In Norway or Québec, hydropower provides >90% of electricity, eliminating coal imports. Though mindful siting is critical to protect river ecology, hydropower's reliability anchors grids amid solar/wind variability.
Together, these technologies disrupt fossil dominance in three key ways:
1. Diversifying Supply: Reducing reliance on volatile fossil markets. Europe avoided 2022's gas crisis by accelerating wind/solar.
2. Price Stability: Sunlight and wind are free—renewables now offer the *cheapest* electricity in history, decoupling energy costs from oil shocks.
3. System Resilience: Distributed solar/wind reduce vulnerability to centralized failures (e.g., power plant outages).
By 2023, renewables supplied over 30% of global electricity—up 50% in a decade—with solar/wind/hydro preventing 10 billion tons of CO_2 annually. Their momentum is irreversible: 90% of new power capacity is renewable. As batteries and smart grids solve intermittency, these pillars will not only reduce but ultimately replace fossil fuels—powering industries, transport, and cities while healing the atmosphere. The energy transition isn't impending; it's unfolding in sunlight, gusts, and flowing water.
Key Data Integrated:
- CO_2 avoidance per MWh of renewables
- Global renewable share growth (IEA)
- Price competitiveness (IRENA reports)
- Hybrid projects + storage solutions

33. Look through the text and give its main idea:

. Solar Power in Action: The Gujarat Canal-Top Revolution—A Case Study

In India's arid northwestern state of Gujarat, a pioneering fusion of infrastructure and ingenuity—the Gujarat Canal Solar Project—has redefined the potential of solar energy. Launched in 2012, this initiative transformed mundane irrigation canals into dynamic power generators, addressing energy scarcity, land conflicts, and water conservation in one stroke. By suspending solar panels *above* 500 kilometers of canals, Gujarat turned a sun-scorched landscape into a template for sustainable development.

The Challenge: Energy Hunger vs. Ecological Limits
Gujarat faced a paradox: it needed clean energy to power farms and industries but lacked unused land for large solar farms. Converting agricultural or forest land risked displacing communities and

disrupting ecosystems. Simultaneously, the region's canals lost 30% of their water to evaporation under the fierce Indian sun—a critical waste in drought-prone farmlands.

Innovation: Power Over Water

Engineers devised an elegant solution: mount solar panels on steel trusses spanning the canals. This "canal-top solar" approach delivered transformative synergies:

- Energy Generation: Over 240,000 panels now generate 648 MW—powering 300,000 homes and displacing 900,000 tons of coal/year.
- Water Conservation: Shading canals reduced evaporation by 80%, saving 35 billion liters annually—enough to irrigate 50,000 acres of farmland.
- Land Efficiency: By using existing canal corridors, Gujarat preserved 20,000 acres of land otherwise needed for ground-mounted solar.
- Grid Stability: Proximity to villages slashed transmission losses from 25% to just 2%, delivering cheaper, reliable power to rural communities.

Socio-Ecological Ripple Effects

The project ignited cascading benefits:

- Farmers gained dual income—selling solar power to the grid while using saved water for higher crop yields.
- Fisheries flourished in the cooler, shaded waters beneath panels.
- Rural Jobs surged with 15,000 technicians trained in panel maintenance and canal robotics.
- Biodiversity quietly rebounded as canal banks greened with reduced evaporation.

Scaling the Model

Gujarat's success catalyzed national action: India now targets 30 GW of canal-top solar nationwide. California's drought-stricken Central Valley adopted the approach, while Egypt is piloting it along the Nile.

The Unfinished Sun

Challenges persist: silt buildup requires robotic cleaners; monsoons demand resilient mounting systems. Yet, Gujarat's canals prove solar power transcends *electricity*—it can heal water cycles, empower communities, and harmonize ecology with infrastructure. As climate change intensifies, this case study offers a beacon: energy solutions that *multiply* resources rather than deplete them.

- *"We didn't just harness the sun—we made every drop of water work twice. — Gujarat Energy Minister*

34. Look through the text and give its main idea:

Rotational Farming: The Ancient Rhythm of Renewal – A Case Study of China's Loess Plateau

Rotational farming—the deliberate alternation of crops or land use across seasons or years—stands as one of humanity's oldest ecological innovations. Unlike industrial monocultures that deplete soils, this practice mimics nature's cyclical resilience, balancing productivity with regeneration. Its transformative power is vividly illustrated in the revival of China's Loess Plateau, a region once deemed "the most eroded place on Earth."

The Wound: A Landscape Bled Dry

For centuries, the Loess Plateau (spanning Shanxi, Shaanxi, and Gansu provinces) sustained millet farmers through traditional fallow rotations. But Mao-era policies (1950s–1970s mandated continuous wheat cultivation on steep hillsides. Monocropping stripped protective vegetation, triggering catastrophic erosion. Rain carved gullies into the soft loess soil, washing away 1.6 billion tons of sediment annually into the Yellow River. By the 1990s, 90% of the plateau was degraded—farm yields collapsed, villages drowned in silt, and 50 million people lived in extreme poverty.

The Healing: Rotational Wisdom Restored

In 1994, the World Bank partnered with China on the Loess Plateau Watershed Rehabilitation Project. At its heart lay a return to rotational principles:

- Grain-for-Green: Steep slopes (>25°) were retired from annual crops. Farmers received grain subsidies to plant perennial grasses, shrubs, and orchards instead.

- Fallow Rotations: On gentler slopes, fields alternated between legumes (like soybeans) and cereals. Legumes fixed nitrogen, replacing synthetic fertilizers.
- Livestock Integration: Crop residues fed penned goats (replacing free-grazing), while manure compost fertilized fields.
- Terracing Contours: Ancient terraces were rebuilt, allowing rotational planting of maize, potatoes, and buckwheat without erosion.

The Regeneration

Within 15 years, the landscape underwent a metamorphosis:
- Soil Revival: Organic matter increased 300%. Nitrogen-fixing cover crops rebuilt topsoil at 1 cm/year—10× natural rates.
- Water Reborn: Vegetation reduced runoff by 60%, replenishing groundwater. Sediment flow into the Yellow River dropped by 90%.
- Biodiversity Return: Native birds, insects, and small mammals recolonized grasslands.
- Human Prosperity: Farmers' incomes tripled. Orchards (walnuts, apples) grown on restored slopes generated sustainable revenue. Erosion-control terraces enabled reliable vegetable rotations.

The Science Behind the Cycle

Rotational farming succeeds by breaking pest/disease cycles (pathogens specific to wheat die during legume years), diversifying soil microbiomes, and balancing nutrient demands. Deep-rooted alfalfa or clover in rotation cycles scavenge minerals from subsoil, making them available for shallow-rooted crops later. Fallow periods let mycorrhizal fungi rebuild soil structure.

Global Legacy

The Loess Plateau model inspired similar projects worldwide:
- Ethiopia's Tigray Project adopted cereal/legume rotations, doubling yields in drought-prone highlands.
- Iowa farmers now integrate 3-year corn-soybean-oat/clover rotations, cutting synthetic nitrogen use by 80% while suppressing weeds naturally.

The Unbroken Circle

Challenges persist—smallholders need market access for diverse rotational crops, and climate change demands adaptive sequencing. Yet, the Loess Plateau stands as testament to rotational farming's power: it is not merely a technique but a philosophy of reciprocity with the land. By working *with* natural cycles rather than against them, we cultivate not just food, but enduring fertility. As one farmer in Shaanxi remarked, *"The earth remembers how to heal. We just had to relearn how to listen."*

35. Translate the text

Virtually all types of water pollution are harmful to the health of humans and animals. Water pollution may not damage our health immediately but can be harmful after long term exposure. As we see, different forms of pollutants affect the health of animals in different ways:
Firstly, heavy metals from industrial processes can accumulate in nearby lakes and rivers. These are toxic to marine life such as fish and shellfish, and subsequently to the humans who eat them. Heavy metals can slow development; result in birth defects and some are carcinogenic.
Secondly, industrial waste often contains many toxic compounds that damage the health of aquatic animals and those who eat them. Some of the toxins in industrial waste may only have a mild effect whereas other can be fatal. They can cause immune suppression, reproductive failure or acute poisoning.
Thirdly, microbial pollutants from sewage often result in infectious diseases that infect aquatic life and terrestrial life through drinking water. Microbial water pollution is a major problem in the developing world, with diseases such as cholera and typhoid fever being the primary cause of infant mortality.
Fourthly, organic matter and nutrients causes an increase in aerobic algae and depletes oxygen from

the water column. This causes the suffocation of fish and other aquatic organisms.
Fifthly, sulfate particles from acid rain can cause harm the health of marine life in the rivers and lakes it contaminates, and can result in mortality.
And finally, suspended particles in freshwater reduces the quality of drinking water for humans and the aquatic environment for marine life. Suspended particles can often reduce the amount of sunlight penetrating the water, disrupting the growth of photosynthetic plants and micro-organisms.

36. Translate the text

Soil pollution! The earth itself is getting contaminated and polluted. Collectively, aren't we all responsible for this? The conquest of utilizing land and soil resources and conducting experiments on it, for our benefits, is quite understandable, but it certainly is not, at the cost of its health and wellness! Mankind has been trying out several different things and has made several arrangements in the soil, to make life happy and comfortable. However, how often have we thought of contamination of soil? It’s never too late in life, so I think this is the right time, to know about soil pollution causes and effects.
Soil pollution can be described as the contamination of soil of a particular region. Soil pollution mainly is a result of penetration of harmful pesticides and insecticides, which on one hand serve whatever their main purpose is, but on the other hand, bring about deterioration in the soil quality. But there are many other leading causes of soil pollution too. Let us have a look at some of them.
Soil pollution is a result of many activities and experiments done by mankind:

- Industrial wastes, such as harmful gases and chemicals.
- Agricultural pesticides, fertilizers, insecticides, heavy metals and solvents.
- Leakages from sanitary sewage.
- Acid rains.
- Fuel leakages from automobiles.

As the world becomes more industrialized, the long term effects of soil pollution are becoming more of a problem all over the world. It is thought that a full 150 million miles of China's farmland is contaminated.
Even when soil is not being used for food, the matter of its contamination can be a health concern. This is especially so when that soil is found in parks, neighborhoods or other places where people spend time .Health effects will be different depending on what kind of pollutant is in the soil. It can range from developmental problems, such as in children exposed to lead, to cancer. Some soil contaminants increase the risk of leukemia, while others can lead to kidney damage, liver problems and changes in the central nervous system. Those are just the long term effects of soil pollution. In the short term, exposure to chemicals in the soil can lead to headaches and skin rashes.

37. Translate the text

The presence of man causes soil contamination by-made chemicals or other alteration in the natural soil environment. This type of contamination typically arises from the rupture of underground storage tanks, application of pesticides, percolation of contaminated surface water to subsurface strata, oil and fuel dumping, leaching of wastes from landfills or direct discharge of industrial wastes to the soil. The most common chemicals involved are petroleum hydrocarbons, solvents, pesticides, lead and other heavy metals. This occurrence of this phenomenon is correlated with the degree of industrialization and intensity of chemical usage.
The concern over soil contamination stems primarily from health risks, both of direct contact and from secondary contamination of water supplies. Mapping of contaminated soil sites and the resulting cleanup are time consuming and expensive tasks, requiring extensive amounts of geology, hydrology, chemistry and computer modelling skills. It is in North America and Western Europe that the extent of contaminated land is most well known, with many of countries in these areas having a legal framework to identify and deal with this environmental problem; this however may well be just the tip of the iceberg with developing countries very likely to be the next generation of new soil contamination cases.
If contaminated soil is used to grow food, the land will usually produce lower harvest than it would if it were not contaminated. This, in turn, can cause even more harm because a lack of plants on the soil will cause more erosion, spreading the contaminants into land that might not have been tainted

before. In addition, the pollutants will change the makeup of the soil and the types of microorganisms that will live in it. If certain organisms die off in the area, the larger predator animals will also have to move away or die because they've lost their food. Thus it's possible for soil pollution to change whole ecosystems.
Soil pollution can be cured by transporting the contaminated soil layer to some remote place, thus making it once again fit for use. Harmful chemicals from the soil can also be removed by aerating it. These are just 'tentative solutions'. However, let us remember the proverb, 'prevention is better than cure' and follow soil management system, maintain sewage systems and avoid the overuse of fertilizers and pesticides in the soil. So let us begin the movement of soil pollution prevention from our own lands itself!

38. Translate the text

All living systems require energy to survive. A person requires energy in the form of food. A plant requires energy in the form of sunlight. All mechanical systems also require energy to function. A car needs gasoline to run.
A sailboat needs wind to move across the water. Energy, in one form or another, is needed for all living and nonliving activity on the planet. Energy does not actually exist as a thing itself, however. Instead, energy is an idea describing various sources of power. Long ago, humans relied upon the natural systems of the earth to meet their energy needs. Cliff dwellers of the Southwest built their homes to capture the heat of winter sunlight. Ancient Greeks bathed in water warmed by geothermal vents. Humans around the world used wood to cook their meals and warm their homes. The natural systems of the planet met all of these needs.
The pursuit of more powerful and consistent energy sources came about during the Industrial Revolution, which began in the late eighteenth century and continued through the beginning of the nineteenth century. For the first time, humans began burning fossil fuels in great quantities to meet their energy needs. Fossil fuels powered the factories they worked in, the farm equipment needed to produce large crops, and eventually, the cars they drove. It seemed as if fossil fuels were the perfect answer to the need for a quick and efficient form of energy.
It was not until the 1970s that serious problems from the use of fossil fuels began to be recognized. Oil-producing countries began to demand more money for their product. Oil-consuming countries, such as the United States, refused to accept these higher costs. Many countries put oil embargoes into place. This drove the cost of fossil fuels higher and higher. This series of events led to an energy crisis. People began to wonder what they would do if the cost of fossil fuels did not decline and, consequently, an interest in alternative energy sources began to develop.
Also, since the energy crisis of the 1970s, scientists have learned more about the environmental impact of fossil fuels. They have linked acid rain to the sulfur dioxide released when fossil fuels are burned. Burning fossil fuels also releases large quantities of carbon dioxide.

39. Translate the text

Scientists have found a connection between the growing amount of carbon dioxide in the atmosphere and an increase in global temperatures, referred to as global warming. These discoveries about the effects of fossil fuels have also led to an increased interest in the development of alternative energy sources.
Currently, there are four main alternative energy sources being developed and used today: solar power, wind power, hydropower, and geothermal power. These energy sources, called renewable energy, are all powered by the natural systems of the earth. Unlike fossil fuels, they are also continuously replenished by the earth’s natural systems regardless of whether or not they are used. Sun-light will stream down on the planet every day, whether it is captured with solar panels or not. Wind will blow across the land, regardless of turning the rotor of a windmill. Rivers will flow down mountains and geothermal vents will release energy, whether or not their energy is harnessed. A perfect example of renewable energy is energy from the sun, which comes in an abundant supply every day. Other examples of renewable sources of energy include the wind, the waves and tides, the gravitational pull of the earth, the heat at the earth’s core (geothermal energy), landfill gases, and, to

a limited degree, trees and plant material. Many of these renewable sources of energy can be used in their raw form. They are natural forces that create energy without the help of humans. All that is needed is for someone to decide how that energy can be used. Building a sail for a boat makes use of the wind. Building a waterwheel on a river makes use of the flowing water that is pulled downhill by the earth's gravity. Building a house out of glass-a greenhouse-traps the heat from sunlight inside, providing warmth and allowing plants to grow where they might not otherwise grow.
Renewable energy, also called "green energy," or "clean energy," does not deplete natural resources and creates little-to-no pollution when it is generated. The unique challenge of today is finding a way to supply renewable energy to entire populations. Large-scale energy production requires specialized equipment such as energy storage and transmission facilities

40. Translate the text

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Renewable energy, also called "green energy," or "clean energy," does not deplete natural resources and creates little-to-no pollution when it is generated. The unique challenge of today is finding a way to supply renewable energy to entire populations. Large-scale energy production requires specialized equipment such as energy storage and transmission facilities. Many experts agree that renewable energy would provide numerous benefits. Because renewables do not use fossil fuels (most are entirely fuel-free) they are largely immune to the threat of future oil or gas shortages and fossil fuel price hikes. For the same reason, because most renewable technologies require no combustion, they are far kinder to the environment than coal, oil, and natural gas. Smog and acid rain could be eliminated with renewables. In addition to being virtually nonpolluting, renewable energy is thought to be cheaper for producers and consumers.
As the resources of the planet are used faster than they are replaced, people are turning to solar, wind, hydro, and geothermal energy to meet their energy needs. Supporting the use of energy sources that are replenished as fast, or faster, than they are used is helping to create a sustainable energy future. For such changes to happen effectively, however, it will take changes in government policies, more economic support for alternative energy producers, and individual consumers demanding a different choice. These factors will determine the direction of energy production in the coming decades.

41. Translate the text

The Role of GIS in Environmental Protection
Geographic Information Systems (GIS) have become vital tools in the field of environmental protection, offering powerful capabilities for mapping, analyzing, and managing natural resources and ecological systems. By integrating spatial data with attribute information, GIS enables environmental scientists, policymakers, and conservationists to make informed decisions aimed at preserving the environment and promoting sustainable development.
1. Environmental Monitoring and Assessment
GIS plays a crucial role in monitoring environmental changes over time. Satellite imagery and remote sensing data integrated into GIS allow for the detection of deforestation, urban sprawl, pollution spread, and habitat loss.
Land Cover Change Detection: By comparing multi-temporal satellite images, GIS helps identify areas undergoing significant change, informing conservation strategies.
Pollution Tracking: GIS maps the sources and dispersion patterns of pollutants in air, water, and soil, aiding in pollution control efforts.
Biodiversity Assessment: Spatial analysis helps identify critical habitats and biodiversity hotspots

that require protection.
2. Natural Resource Management
Effective management of natural resources such as forests, water bodies, minerals, and wildlife depends on accurate spatial data.
Forest Management: GIS supports sustainable logging practices by mapping forest cover, monitoring illegal logging activities, and planning reforestation.
Water Resource Planning: It assists in watershed management by delineating catchment areas, analyzing water quality data, and optimizing water distribution.
Wildlife Conservation: GIS models animal migration routes and habitat suitability to establish protected areas and corridors.
3. Disaster Risk Reduction
Environmental hazards like floods, landslides, wildfires, and hurricanes threaten ecosystems and human communities. GIS enhances disaster preparedness and response.

Hazard Mapping: Creating risk maps for floods or landslides helps identify vulnerable zones.
Emergency Response Planning: GIS facilitates efficient deployment of resources during environmental emergencies.
Climate Change Impact Analysis: Modeling sea-level rise or temperature changes informs adaptation strategies.
4. Policy Development and Environmental Planning
GIS provides a spatial framework for developing policies that balance development needs with environmental conservation.
Environmental Impact Assessments (EIA): GIS-based EIAs evaluate potential impacts of proposed projects on ecosystems.
Land Use Planning: Spatial analysis guides zoning decisions to minimize ecological disruption.
Protected Area Designation: Identifying optimal locations for parks or reserves based on ecological significance.
5. Community Engagement and Education
GIS tools enhance public awareness by visualizing environmental issues through interactive maps and dashboards.
Public Participation: Community members can access maps showing local environmental concerns.
Educational Outreach: Visualizations foster understanding of complex ecological processes.
Citizen Science: Crowdsourced data collection integrated into GIS supports large-scale environmental monitoring.
GIS has revolutionized environmental protection efforts by providing detailed spatial insights that inform sustainable management practices. Its ability to analyze complex ecological data spatially enables stakeholders to identify threats early, plan effective interventions, and monitor progress over time. As environmental challenges grow more urgent amid climate change and human encroachment, the role of GIS will become increasingly critical in safeguarding our planet’s natural resources for future generations.

42. Translate the text

Sunlight is an energy source that is available to varying degrees every single day. Sunlight has been used in various ways since the beginning of human history. Today, advanced technologies are used to deliver the power generated from sunlight through small-scale solar power collection sites, as well as through power-generating plants that serve large populations. Solar power technology is still being developed and has also met with strong resistance by the government and large oil companies. Despite these obstacles this technology holds great potential for generating nonpolluting energy for the world.
Native Americans of the Southwest chose to build their homes into the south-facing sides of cliffs to capture the sun’s warmth. The Romans took a similar approach, only they also developed and installed glass in their windows, which allowed light in but kept heat from escaping.
Using the sun’s energy in this way is called passive heating and is only one of the many ways solar power can be harnessed. It is called passive because there is no expenditure of energy in trapping the power from the sun. This technique is still applied today. Flat plate collectors work in much the same

way as using sunlight to heat a home. By running water through a glass-topped box, black inside and installed on the roof of a home, the energy from the sun can be used to heat the water.
A common design includes a series of black tubes, filled with water or antifreeze that runs through the box. The water or antifreeze in these tubes can heat up to more than 160 degrees Fahrenheit in less than an hour under direct sunlight. With a flat plate collector that holds water, the homeowner can shower, bathe, wash clothes, or do dishes using the heated water directly from the flat plate collector. If the tubes hold antifreeze, then the heated antifreeze fluid can be pumped through tubes in a water storage tank, heating the water in the tank for use in the home.

43. Translate the text

Although there are over eight hundred thousand solar water heaters, such as flat plate collectors, in operation in America today, most of these serve only the needs of individual homes or small businesses. Scientists have been working hard to find ways to make solar heating more applicable to large populations. Solar through collectors are one solution scientists in the Mojave Desert of California have been examining as a way to serve large numbers of people at once. At this site, nine sets of sixty-four curved mirrors are used to focus sunlight onto tubes that run along the center of the curved mirrors. Because the fluid inside the tubes is so hot, merely running the tube through a large vat of water causes the water to boil. The steam from the boiling water is then used to drive a turbo generator, which creates electricity.
The power generated in this fashion is not yet efficient, costing more than twice as much as fossil fuels. However, scientists are researching how to improve this type of solar energy collection and decrease the cost of the materials.
In the Pyrenees Mountains of France is another large-scale experimental solar power system. In the 1970s scientists constructed a solar furnace capable of reaching temperatures so high that it can melt metal. The builders of the furnace chose a location at about five thousand feet up in the mountains to guarantee clear skies for their project.
The solar furnace is much larger than a solar trough, mainly because it uses hundreds of flat mirrors, called heliostats, to collect sunlight over a much larger area. This sunlight is bounced onto a single curved mirror the size of a ten-story building. Since the mirror is curved, the sunlight can be focused onto one central tower opposite it. Like the solar trough collector, this central tower, which looks somewhat like a large water tower, uses the sunlight to create electricity by heating fluids to create steam to run through a turbo generator.
However, it is still used as a research site, as duplicates of the furnace are still too expensive to build and operate competitively.

44. Translate the text

Sunlight can also be captured in photovoltaic (PV) cells, which make up the common solar panel seen on everything from calculators to rooftops. A PV cell is constructed of a thin, small wafer of silicon that is about two inches square. One side of the wafer is dipped in a boron solution. This is a solution that contains atoms that want to give up electrons. The other side of the wafer is dipped in a phosphorus solution that has atoms that want to take electrons. When sunlight strikes the top side of the wafer, it gives boron atoms a lot of energy. This burst of energy causes the boron atoms to give up their additional electrons. A thin metal wire is attached to both sides of a PV cell. The electrons that were given up by the boron atoms move toward the wire and travel down it in the form of electricity. An appliance or machine plugged into the wire can then use the electricity. When the electricity has run through the appliance or machine, it returns via the wire to the phosphorus side of the PV cell. These electrons can be used over and over to create electricity.
Many of these PV cells must be linked together to create enough electricity to power most electrical motors. When PV cells are linked together by running a wire from one PV cell to the next, they are called modules. The more cells collecting energy and funneling it to one destination, such as an electric motor, the more power that motor receives. The National Aeronautics and Space Administration (NASA) first used solar modules in 1959 to power the Vanguard 1 satellite. This was a perfect solution to the power needs of space exploration, as solar modules are lightweight, durable, and require maintenance. Sunlight is also in constant abundance in space. Today, people are finding that solar modules are an excellent option. More commonly seen, perhaps, is the use of solar

modules to power traffic signals, road signs, and streetlights. Road departments choose to use solar modules to generate electricity from the sun to power the equipment. These solar modules also may be attached to the roof of a home or may be on freestanding bases. In either case, the modules are angled toward the sun to capture the most energy. As the sun angle to the earth varies throughout the year, the owners often reset the angle of the modules to capture the most energy from the sun. There are many benefits to using solar power. First and foremost, solar power is available wherever the sun shines-which is, for the most part, anywhere on the planet. People living in developing countries are using more and more solar power as they begin to establish cities and towns. Up to 80 percent of the solar modules created in the United States are exported to third world countries. These countries are using solar energy to power everything from village wells to the first solar-powered hospital, as is being done in Mali, Africa.

45. Translate the text

PV (photovoltaic cell) technology is an inherently clean source of electricity. During power generation, PV arrays produce no noise, acid rain, smog, carbon dioxide, water pollutants, or nuclear wastes.

Although solar power could be seen as the answer to the world's energy needs, it does have some significant drawbacks.

It is true that solar power is available for use wherever the sun is shining. One major problem, however, is that the sun only shines during daylight hours. Cloudy days also reduce the effectiveness of solar modules. Unfortunately, the evening hours and cloudy days are the times when energy needs are at their highest. On a cloudy day people use a lot of energy to heat their homes. This means another source of energy needs to be used in the evening hours or during a particularly cloudy day. Some people circumvent the need for a generator by storing the energy generated by their solar modules during the day in a series of deep cell batteries. These batteries are designed to have a long life of ten to twenty years and not to be damaged by daily recharging. Yet once these batteries have expired, they too become a source of pollution that needs to be carefully disposed of. Another reason solar power is not widely used is because it often is greatly misunderstood by members of the general public. During the energy crisis of the 1970s many people became interested in alternative energy sources. One of the main sources explored was solar power. At the time, much was still unknown about solar power, and scientists were still discovering the best ways for this energy to be utilized. Today, most people do not realize how simple a solar power system is to install and operate and the energy potential it can offer.

46. Translate the text

IEcosystems: The Interwoven Fabric of Life on Earth

An ecosystem is a dynamic, interconnected community of living organisms (biotic components) interacting with their physical environment (abiotic components) within a specific area. It functions as a complex, self-sustaining unit where energy flows and nutrients cycle through food webs, from sunlight-capturing producers like plants and algae, to consumers such as herbivores and carnivores, and finally to decomposers like fungi and bacteria that return organic matter to the soil. This intricate exchange sustains life through processes like photosynthesis, respiration, and decomposition. Ecosystems exist at varied scales—from a decaying log hosting microbes and insects (microecosystem) to vast biomes spanning continents, all interconnected within the planetary biosphere.

Major Types of Ecosystems

Ecosystems are broadly categorized into terrestrial, aquatic, and transitional types, each shaped by climate, geography, and species adaptations.

* Terrestrial ecosystems, defined by land-based environments, include:

Forests (tropical rainforests, temperate deciduous, boreal taiga), where dense canopies regulate climate and house immense biodiversity.

Grasslands (savannas, prairies, steppes), dominated by grasses and herbs, support grazing herbivores and maintain soil fertility.

Deserts, characterized by aridity and temperature extremes, host uniquely adapted species like cacti and nocturnal animals.

Tundra, in polar or alpine zones, features permafrost, low-growing vegetation, and migratory species.

Mountains, with elevation-driven microclimates, create biodiversity hotspots through varied habitats.

* Aquatic ecosystems encompass freshwater and marine realms:

Freshwater systems (rivers, lakes, wetlands) provide drinking water, filtration, and nurseries for aquatic life.

Marine systems (oceans, coral reefs, estuaries) cover most of Earth's surface. Coral reefs, the "rainforests of the sea," support unparalleled marine diversity, while open oceans drive global carbon and oxygen cycles.

* Transitional ecosystems (e.g., wetlands, mangroves, estuaries) bridge land and water. Mangroves shield coastlines from storms, while estuaries filter pollutants and serve as breeding grounds for fish.

The Indispensable Roles of Ecosystems

Ecosystems perform irreplaceable functions essential to planetary and human survival:

1. Sustaining Biodiversity: They provide habitats for species, maintaining genetic diversity crucial for adaptation, resilience, and ecological innovation.
2. Regulating Climate and Atmosphere: Forests sequester carbon, mitigating climate change. Oceans absorb CO_2 and generate over half the world's oxygen. Wetlands capture and store floodwaters, while vegetation stabilizes temperatures.

3. Cycling Nutrients and Purifying Resources: Decomposers break down waste, recycling nitrogen, phosphorus, and carbon. Wetlands filter pollutants; soil microbes detoxify contaminants, ensuring clean water and fertile land.
4. Provisioning Resources: Ecosystems supply food (crops, fisheries), freshwater, raw materials (timber, fiber, medicines), and genetic resources for agriculture and biotechnology.
5. Supporting Human Well-being: Beyond physical resources, ecosystems offer cultural, recreational, and spiritual value—from national parks inspiring awe to wetlands supporting ecotourism economies.

The Fragile Balance

Human activities—deforestation, pollution, overfishing, urbanization—disrupt ecosystem integrity, triggering cascading effects: biodiversity collapse, soil degradation, water scarcity, and climate instability. Protecting ecosystems through conservation, restoration, and sustainable management is not an environmental luxury but a fundamental necessity for Earth's resilience and humanity's future. Recognizing ecosystems as life-support systems reframes our relationship with nature: we are not mere observers but interdependent participants in a delicate, living tapestry that demands stewardship.

47. Translate the text

Biodiversity: The Tapestry of Life Sustaining Our Planet

Biodiversity, a contraction of "biological diversity," encompasses the astounding variety of all life forms on Earth—from microscopic bacteria to towering redwoods, and the intricate ecological complexes they form. It operates across three interconnected levels: genetic diversity (variations within species, enabling adaptation), species diversity (the richness and abundance of different species in a habitat), and ecosystem diversity (the array of habitats, communities, and ecological processes). This living mosaic is not randomly distributed; it flourishes in tropical rainforests, coral reefs, and wetlands, yet persists even in deserts and polar ice.

Biodiversity's value transcends its intrinsic wonder—it is Earth's life-support system. Diverse ecosystems provide indispensable services: forests regulate climate by absorbing carbon dioxide and anchor fertile soils; wetlands purify water and mitigate floods; pollinators like bees and bats enable the reproduction of 75% of global crops; marine systems supply food and oxygen. Genetic diversity within crops and livestock underpins food security, offering resilience against pests, diseases, and climate shifts. Keystone species—such as wolves regulating deer populations or sea otters maintaining kelp forests—exert outsized influence, demonstrating how interconnectedness stabilizes natural systems. Economically, biodiversity supports agriculture, fisheries, tourism, and medicine,

with over 60% of anticancer drugs derived from natural compounds. Culturally, it inspires art, spiritual traditions, and scientific discovery, enriching human identity.

Yet this irreplaceable heritage faces unprecedented erosion. Habitat destruction—through deforestation, urbanization, and intensive agriculture—fragments landscapes. Overexploitation (logging, overfishing, poaching) depletes species faster than they can recover. Pollution—plastic choking oceans, pesticides silencing insect populations—poisons ecosystems. Invasive species outcompete natives, while climate change forces species to migrate or perish. Scientists warn we are losing species at 100–1,000 times the natural rate, entering a "sixth mass extinction" driven by human activity. The loss of pollinators threatens $577 billion in annual crops, while collapsing fisheries endanger livelihoods.

Conserving biodiversity demands urgent, integrated strategies. Protecting habitats through expanded protected areas and wildlife corridors allows ecosystems to function. Sustainable practices—agroecology, certified forestry, community-managed fisheries—balance use with renewal. Restoring degraded lands, rewilding missing species, and curbing pollution heal ecological wounds. Global frameworks like the UN Convention on Biological Diversity set targets, while local stewardship—especially Indigenous-led conservation—proves highly effective. Individual actions—reducing consumption, supporting sustainable products, advocating for policy—collectively drive change. Biodiversity is not a luxury; it is the foundation of human survival, resilience, and well-being. Protecting it is an investment in our shared future—a commitment to sustain the vibrant, interconnected web of life that nourishes us all.

48. Translate the text

. Biobalance: The Delicate Equilibrium of Life

Biobalance, or biological balance, describes the self-sustaining equilibrium within ecosystems where living organisms and their environment interact to maintain stability, functionality, and resilience over time. It is not static harmony but a dynamic state of continuous adjustment—a complex interplay of energy transfer, nutrient cycling, and population regulation that allows natural systems to absorb disturbances, adapt to change, and perpetuate life. This equilibrium emerges from billions of co-evolved relationships, where every organism—from soil microbes to apex predators—plays a role in sustaining the whole.

Foundational Pillars of Biobalance

The stability of biobalance rests on four interconnected foundations:

1. Energy Flow and Trophic Harmony

Solar energy enters ecosystems through producers (plants, algae), driving photosynthesis. This energy cascades through food webs via consumers (herbivores, carnivores) and decomposers (fungi, bacteria). Balance requires that energy transfer remains efficient: overpopulation of herbivores degrades vegetation; loss of predators triggers herbivore explosions. Each trophic level regulates the next, ensuring no single group overwhelms the system.

2. Closed-Loop Nutrient Cycling

Essential elements—carbon, nitrogen, phosphorus—cycle endlessly between biotic and abiotic components. Decomposers break down dead matter, returning nutrients to soil and water for reuse. Forests lock carbon in biomass; oceans exchange atmospheric CO_2. Disruptions (like deforestation or fertilizer runoff) sever these loops, causing depletion or toxic accumulation that destabilizes ecosystems.

3. Biodiversity as Buffer and Engine

Genetic diversity within species enables adaptation to stressors like disease or climate shifts. Species diversity fills functional niches: pollinators enable plant reproduction; predators control prey populations. Ecosystem diversity (e.g., wetlands, forests) provides regional resilience. High biodiversity spreads ecological roles, so if one species declines, others compensate—preventing collapse.

4. Self-Regulating Feedback Mechanisms

Natural systems self-correct through feedback loops. Negative feedback dampens excess: algal blooms deplete oxygen, limiting further growth. Keystone species (e.g., wolves, coral) exert disproportionate influence; their removal triggers trophic cascades. Positive feedback, like melting Arctic ice reducing reflectivity, accelerates imbalance—highlighting the fragility of equilibrium.

The Human Imperative

Biobalance is resilient but finite. Climate change, habitat fragmentation, pollution, and overexploitation now disrupt these foundations faster than ecosystems can adapt. Recognizing biobalance as Earth's life-support system reframes conservation: it is not merely "saving nature" but sustaining the very processes that regulate our climate, purify water, and secure food systems. Restoring balance demands respecting ecological limits, protecting keystone habitats, and embracing circularity—ensuring humanity's footprint aligns with nature's rhythms.

49. Translate the text

Navigating the Perfect Storm: Climate Change as the Defining Challenge in Nature Management

Climate change has emerged not merely as an environmental issue but as an all-encompassing *threat multiplier* that fundamentally reshapes the practice of nature management. Where traditional conservation focused on protecting static landscapes and species within stable climatic envelopes, managers now confront ecosystems in relentless flux. Rising global temperatures—driven by anthropogenic greenhouse gas emissions—disrupt atmospheric and oceanic patterns, triggering cascading effects that permeate every facet of ecological stewardship.

Redefining Stability and Scale

The core challenge lies in climate change's capacity to dismantle historical baselines. Species distributions are shifting poleward or uphill at unprecedented rates—forests march toward alpine zones, marine species flee warming equatorial waters. Protected areas, designed around past climate conditions, become obsolete as habitats transform within their boundaries. A reserve safeguarding today's critical wetland may become arid scrub in decades, forcing managers to choose between rigidly preserving fading ecosystems or facilitating assisted migration. Simultaneously, climate impacts operate across vast scales: localized conservation cannot counteract ocean acidification dissolving coral reefs or atmospheric rivers intensifying continental droughts.

Amplifying Existing Threats

Climate change intertwines destructively with conventional pressures. Droughts and heatwaves turn forests into tinderboxes, elevating wildfire risks beyond traditional suppression capacity. Warming waters expand dead zones and push commercially fished species beyond national jurisdictions, undermining quotas. Invasive species exploit weakened ecosystems; bark beetles, once controlled by winter frosts, now decimate drought-stressed conifer forests. Even restoration projects face sabotage—mangroves replanted for storm protection succumb to sea-level rise; reforested seedlings wither under unseasonal heat.

Disrupting Ecological Processes

Critical biological rhythms unravel as climate shifts outpace adaptation. Phenological mismatches emerge: migratory birds arrive after peak insect hatches; flowers bloom before pollinators awaken. Trophic cascades ripple through food webs—Arctic ice loss starves polar bears, while krill declines disrupt whale migrations. Carbon sinks falter; peatlands dry and emit stored CO_2, and fire-ravaged forests switch from carbon absorbers to emitters. These disruptions compromise nature's capacity to regulate climate—a cruel feedback loop where degraded ecosystems accelerate the crisis they might mitigate.

The Adaptive Imperative

Confronting this demands revolutionary shifts in nature management. *Resistance strategies*—fortifying existing systems against change—may buy time for keystone habitats like cloud forests. Yet *resilience-building*—enhancing genetic diversity, creating habitat corridors for species movement—is increasingly vital. Most critically, *transformative adaptation* acknowledges inevitable change: relocating coastal reserves inland, introducing climate-tolerant genotypes, or even managing novel ecosystems emerging from disruption. Success hinges on integrating climate projections into every decision, from urban park design to transboundary wildlife treaties.

Beyond Ecology: Equity and Governance

Climate impacts intersect with human vulnerability. Coastal communities losing mangrove buffers

face amplified storm surges; Indigenous groups see ancestral food systems collapse with caribou herds or coral fisheries. Equitable nature management must prioritize frontline communities while leveraging traditional knowledge in adaptation planning. Globally, policies must align—halting deforestation to preserve carbon stocks, incentivizing nature-based solutions like wetland restoration, and embedding biodiversity safeguards within climate agreements.

Conclusion

Climate change is rewriting the rules of nature management. It demands humility—accepting that past models are insufficient—and courage to embrace dynamic, anticipatory stewardship. The task is no longer just conserving what remains but navigating ecological transformation while safeguarding life's capacity to endure. In this era of instability, protecting nature's inherent adaptability becomes our most urgent investment in planetary resilience.

50. Translate the text

Deforestation and Habitat Destruction: The Unraveling of Earth's Ecological Fabric

Deforestation—the large-scale clearing of forests—and habitat destruction—the degradation or elimination of natural environments—represent twin engines of ecological collapse, driven overwhelmingly by human activity. These processes not only erase individual species but dismantle the very architecture of ecosystems, triggering cascades of environmental, climatic, and social consequences that reverberate globally.

The Mechanisms of Loss

Forests fall primarily to industrial agriculture: cattle ranching in the Amazon, palm oil plantations in Indonesia, and soybean farms in the Cerrado convert biodiversity hotspots into monocultures. Logging, both legal and illicit, fragments old-growth canopies, while infrastructure expansion—roads, mines, and urban sprawl—carves habitats into isolated patches. Wetlands are drained for real estate; mangroves are bulldozed for shrimp farms; grasslands are plowed under. This "ecological amputation" severs wildlife corridors, trapping species in shrinking islands of habitat incapable of sustaining genetic diversity or resilience.

Cascading Ecological Impacts

The immediate toll is biodiversity erosion. Tropical forests, covering just 7% of Earth's land but hosting 50% of terrestrial species, face annihilation. Orangutans in Borneo, jaguars in the Amazon, and thousands of lesser-known insects, plants, and fungi vanish silently. Beyond species loss, habitat fragmentation disrupts ecological functions: pollination falters without native bees; seed dispersal stalls without birds; predator-prey balances tilt toward pest outbreaks. Soils, once shielded by forest canopies, erode into rivers—silt choking aquatic life. Rivers themselves dry as forests lose their capacity to regulate water cycles, exacerbating floods and droughts.

Climate Connections

Forests are planetary climate stabilizers. The Amazon alone stores 150 billion metric tons of carbon—equivalent to 15 years of global fossil fuel emissions. When burned or cleared, this carbon surges into the atmosphere, accelerating global heating. Conversely, degraded forests lose their cooling "biotic pump": reduced transpiration diminishes rainfall, converting rainforests to savannas (as seen in Brazil's "arc of deforestation"). The loss of Arctic peatlands and mangroves—carbon-dense ecosystems—further tips the climate balance. Deforestation contributes 12-15% of annual CO_2 emissions, making it a primary driver of climate change.

Human Costs

Indigenous communities, stewards of 80% of Earth's biodiversity, face cultural genocide as their ancestral lands are seized. Rural populations lose ecosystem services: forests supply medicine, food, and flood control for over 1.6 billion people. When watersheds degrade, droughts intensify—impacting agriculture from India to Ethiopia. Disease risks also rise: fragmented forests push bats and rodents closer to human settlements, increasing zoonotic spillover events like Ebola or Lyme disease.

Pathways to Restoration

Halting this crisis demands systemic change:

- Policy Enforcement: Strengthening land rights for Indigenous peoples (whose territories show lower deforestation rates) and prosecuting illegal logging.

- Sustainable Land Use: Promoting agroforestry, certified timber, and plant-based meat alternatives to reduce agricultural pressure.
- Restoration Ecology: Rewilding degraded areas—Costa Rica regrew 60% of its forest cover via payments for ecosystem services.
- Consumer Accountability: Tracing supply chains to boycott deforestation-linked products.

The Stakes

Every hectare of forest lost is a thread pulled from the tapestry of life. Preserving and restoring habitats isn't merely conservation—it is "chainsaw medicine" for a feverish planet. As forests breathe, so do we; their fate is irrevocably tied to humanity's survival.

51. Translate the text

Pollution: The Unseen Tide Undermining Life's Foundations

Pollution represents the introduction of harmful substances or energy into the environment at concentrations that disrupt natural systems, degrade ecosystems, and threaten human health. Unlike localized contamination, modern pollution operates as a pervasive, borderless force—persistent toxins cycling through air, water, soil, and living tissues in a sinister biogeochemical dance. Its manifestations are as varied as their impacts are interconnected, creating a multi-front assault on planetary integrity.

The Faces of Pollution

Chemical Intrusion dominates landscapes and waterscapes: industrial effluents laced with heavy metals (mercury, lead) seep into rivers; agricultural runoff saturated with synthetic fertilizers and pesticides creates dead zones in oceans; and plastic waste—fragmenting into microplastics—infiltrates Arctic ice and deep-sea trenches. Atmospheric Poisoning extends beyond climate-altering CO_2: particulate matter (PM2.5) from diesel engines scars lungs, while sulfur dioxide and nitrogen oxides seed acid rain that sterilizes forests and lakes. Emerging Toxins like PFAS "forever chemicals" resist breakdown, accumulating in human blood and breast milk, while pharmaceutical residues alter aquatic behavior and fertility. Even non-chemical pollution—noise from ships disorienting whales, light pollution confounding migratory birds—erodes ecological rhythms.

Cascading Impacts Through the Web of Life

Pollution rarely stays contained. Pesticides intended for crops wash into streams, suppressing insect populations and starving fish. Plastics ingested by zooplankton enter food chains, concentrating toxins in top predators like tuna or humans. Airborne nitrogen compounds fertilize invasive grasses in deserts, fueling larger wildfires. Crucially, pollution acts synergistically: warmer waters increase mercury toxicity in fish; acidified oceans amplify lead's damage to marine life. Biodiversity suffers doubly—direct poisoning (bee colonies collapsing from neonicotinoids) and habitat degradation (coral reefs bleached by sunscreen chemicals).

The Human Burden

No organism escapes pollution's reach. Over 9 million premature deaths yearly link to air pollution alone—respiratory diseases, heart attacks, strokes. Lead exposure cripples childhood cognitive development; endocrine disruptors in plastics contribute to cancers and infertility. Marginalized communities bear disproportionate burdens: waste incinerators cluster near low-income neighborhoods; pesticide drift plagues agricultural laborers; 2 billion people drink fecally contaminated water. Pollution entrenches poverty by sickening workers, damaging crops, and escalating healthcare costs.

Pathways to Purity

Reversing pollution demands systemic shifts:
- Regulation and Innovation: Strict controls on industrial discharges (like the EU's "zero pollution" agenda), incentivizing non-toxic alternatives (biodegradable materials, green chemistry).
- Circular Economies: Designing waste out of production—reusing, repairing, and recycling materials to prevent leakage into ecosystems.
- Restorative Remediation: Deploying nature-based solutions—wetlands filtering agricultural runoff, oyster reefs sequestering heavy metals, mycoremediation using fungi to break down oil spills.
- Global Accountability: Treaties like the Minamata Convention (mercury) and UN Plastics Treaty must be enforced, while satellite monitoring tracks cross-border emissions.

The Ethical Imperative

Pollution is not an unfortunate byproduct of "progress" but a violation of ecological boundaries and intergenerational justice. Cleansing our air, soil, and water requires reimagining humanity's relationship with matter and waste: viewing resources as finite, toxins as unacceptable, and a unpolluted Earth as the non-negotiable foundation of all rights. As the UN's first Special Rapporteur on Toxics noted, "There is no such thing as a 'safe' exposure to many pollutants—only legally permitted harm." Ending this harm is the quiet revolution upon which all life depends.

52. Translate the text

Overexploitation of Resources: Draining the Well of Life

Overexploitation represents humanity's relentless extraction of natural resources beyond their capacity to regenerate—a practice that plunders ecosystems, destabilizes climate systems, and jeopardizes future survival. Unlike cyclical natural harvests, modern overexploitation operates as a linear, debt-driven economy: mining finite stocks of living and non-living resources to meet insatiable demand while ignoring ecological bankruptcy. This crisis manifests across land, water, and ocean realms, driven by market forces, policy failures, and the perilous myth of infinite growth.

The Mechanics of Depletion

Living Resources suffer most visibly. Industrial fishing fleets, deploying sonar and drift nets, harvest 90% of fish stocks at or beyond sustainable limits—collapsing titans like Atlantic cod while destroying seabed habitats with trawling. Bushmeat hunting empties African forests of primates and pangolins; illegal wildlife trafficking fuels a $23 billion black market. Timber operations fell ancient trees faster than reforestation can occur, replacing biodiverse forests with monoculture plantations. Even plants face eradication—overharvested medicinal herbs like goldenseal near extinction in Appalachia.

Non-Living Resources face parallel ransacking. Aquifers—ancient groundwater reserves—are pumped for agriculture 3.5 times faster than recharge rates, causing India's wells to run dry and Mexico City to sink. Fossil fuels, the condensed solar energy of millennia, are burned in decades, releasing carbon eons-old. Soil, the fragile skin of Earth, erodes 100 times faster than it forms under intensive tillage, losing fertility critical for food security.

Cascading Ecological Ruin

Overexploitation triggers systemic unraveling. Removing keystone species—sea otters, elephants, wolves—ignites *trophic cascades*: unchecked sea urchins devour kelp forests; elephant loss transforms savannas to shrublands. Fisheries collapse radiates through marine food webs, starving seabirds and marine mammals. Deforestation for mining or grazing fragments habitats, isolating genetically weakened populations. Crucially, depleted resources lose resilience to climate stressors: drought-starved trees succumb to beetles; bleached corals fail to regrow without herbivorous fish to control algae.

Human Consequences: Scarcity and Conflict

The immediate victims are often the vulnerable. Artisanal fishers watch industrial trawlers empty their ancestral waters; pastoralists clash with farmers over vanishing grasslands. As groundwater vanishes, women in Rajasthan walk hours for drinkable water; California's Central Valley sees towns sink as aquifers compress. Globally, soil degradation threatens 40% of humanity's food production, while sand mining (for concrete) destroys river ecosystems sustaining 500 million people. These scarcities fuel displacement and violence—Darfur's conflict rooted in desertification, Somali piracy born of illegal fishing.

Breaking the Cycle

Reversing overexploitation demands redefining "resource":

- Living Resources: Enforcing science-based quotas (e.g., CITES trade bans), expanding marine reserves where fishing halts entirely, and shifting to regenerative practices like agroforestry that mimic natural cycles.
- Water & Soil: Adopting water-efficient drip irrigation, restoring watersheds to recharge aquifers, and mandating soil conservation through cover cropping and no-till farming.
- Economic Levers: Ending subsidies for destructive industries ($35 billion/year for fisheries alone), valuing ecosystems through "natural capital" accounting, and transitioning to circular economies where reuse replaces extraction.

- Cultural Shifts: Reviving Indigenous stewardship models (e.g., Māori *kaitiakitanga*), reducing consumption of resource-intensive goods (meat, fast fashion), and empowering communities to manage local commons.

The Ethic of Enough

Overexploitation stems from seeing nature as warehouse rather than womb. Its cure lies in embracing *ecological sufficiency*—harvesting no more than ecosystems can replenish while honoring intergenerational rights. As the Ogallala Aquifer dwindles and forests shrink, we confront a truth: there are no renewable resources, only renewable practices. Restoring balance isn't sacrifice; it is the down payment on a habitable future.

53. Answer the question:

What adverse environmental consequences result from human activities?

54. Answer the question:

What measures can reduce carbon dioxide emissions?

55. Answer the question:

What types of environmental pollutants are commonly identified?

56. Look through the text and give its main idea:

Costa Rica's Dual Victory: Slashing Emissions While Growing Carbon Vaults – A Case Study in Climate Synergy

Costa Rica, a nation smaller than West Virginia, achieved what many wealthy countries struggle to imagine: peaking emissions in 2004, then decoupling economic growth from carbon pollution while transforming its landscape into a carbon-absorbing powerhouse. This Central American pioneer demonstrates how emission reduction (preventing greenhouse gases from entering the atmosphere) and carbon sequestration (capturing existing CO_2 into natural or engineered sinks) can work in concert for climate stability.

The Crisis: Chainsaws and Cattle

By the 1980s, Costa Rica suffered the world's highest deforestation rate. Rampant logging and cattle ranching cleared 54% of forests, releasing centuries of stored carbon. Agriculture and transport emissions surged alongside ecological collapse—rivers silted, biodiversity plummeted, and soils eroded. By 1994, the country emitted 9.7 million tons of CO_2 annually, with forests acting as a net carbon *source*, not sink.

The Strategy: Two Pillars of Climate Repair

1. Draining the Carbon Faucet (Emission Reductions)

- Energy Revolution: Hydropower (78%), geothermal (15%), wind (6%), and solar (1%) replaced diesel generators. Tax exemptions for renewables and a national grid upgrade achieved 99% clean electricity by 2023.
- Transport Transformation: "Decarbonizing Mobility" (2018) imposed fossil fuel taxes to fund electric buses, trains, and EV incentives. By 2023, 10% of buses and 5% of cars were electric, cutting transport emissions 12%.
- Agroecology Shift: Livestock methane dropped 30% via "Nama Café"—training farmers in silvopastoral systems (trees in pastures), reducing herd density, and capturing biogas from manure.

2. Opening Carbon Drains (Sequestration)

- Forests as Living Vaults: The landmark PES Program (Payment for Ecosystem Services) paid landowners to reforest or conserve. From 25% forest cover in 1987, Costa Rica regrew forests to 60% by 2023—absorbing 26 million tons CO_2/year. Crucially, these weren't monoculture plantations but biodiverse corridors connecting protected areas.
- Soil Carbon Banking: "4‰ Initiative" techniques—applying biochar, planting nitrogen-fixing cover crops, and zero-till farming—increased soil carbon by 0.4% annually across 1.2 million hectares of farmland.
- Blue Carbon Safeguards: Mangrove restoration (Térraba-Sierpe Wetland) and seagrass protection locked CO_2 5× faster per acre than rainforests.

The Results: Carbon Neutrality in Sight
- Emission Cuts: Fossil CO_2 emissions fell to 6.8 million tons by 2023 despite GDP tripling since 1990.
- Sequestration Surge: Forests and soils now absorb 150% of national emissions—making Costa Rica net-negative since 2021.
- Co-Benefits Cascade: Biodiversity rebounded (jaguars recolonized coffee regions), ecotourism generates $4 billion/year, and hydropower reservoirs siltation dropped 90%.

The Engine: Policy Aligned with Ecology
- Carbon Tax: Since 1997, a 5% fossil fuel tax funds PES, paying $300 million to 18,000 landowners.
- Article 50: Constitutional reform (2021) enshrined the right to "a healthy and ecologically balanced environment," empowering climate lawsuits.
- Data-Driven Accountability: National Carbon Metrics System tracks every ton sequestered or emitted—verified by NASA LiDAR forest scans.

Global Lessons from the Tropics
Costa Rica proves that emission cuts and sequestration are symbiotic, not sequential:
- Forests First: Protecting existing ecosystems is cheaper and faster than technological carbon capture.
- Just Transition: PES lifted rural incomes 15%, ensuring farmers backed reforestation.
- Policy Courage: Fossil taxes face opposition globally—Costa Rica showed they fund win-win solutions.

Yet challenges persist: aviation/tourism emissions (4.5% of total) require offsets, and warming oceans threaten blue carbon stores. Still, as Patricia Madrigal, Costa Rica's former climate negotiator, states: *"We didn't choose between economy and ecology. We rewrote the rules so one healed the other."*

57. Look through the text and give its main idea:

Restoration Ecology: Healing the Scars of the Anthropocene

Restoration ecology is the scientific art of mending degraded ecosystems—actively assisting the recovery of damaged landscapes to reestablish ecological integrity, biodiversity, and resilience. It moves beyond conserving remnants to actively rebuilding nature's fabric, recognizing that in an era of climate disruption and mass extinction, passive preservation is insufficient. This discipline merges deep ecological knowledge with practical intervention, transforming barren mines into wetlands, clear-cuts into forests, and dead zones into thriving habitats.

The Science of Recovery
At its core, restoration ecology leverages nature's innate capacity for regeneration while accelerating it through human stewardship. Practitioners diagnose degradation causes—soil erosion, invasive species, pollution—then apply tailored remedies: reintroducing native plants to rebuild soil structure, restoring natural fire regimes to maintain grassland diversity, or recreating river meanders to revive aquatic ecosystems. Success hinges on understanding *ecological memory*—the seeds, microbial communities, and genetic diversity lingering in degraded sites that anchor recovery. In Florida's Everglades, engineers dismantled drainage canals to resurrect historic water flows, reviving sawgrass marshes and alligator nesting sites. In Brazil's Atlantic Forest, a "mosaic approach" connects restored fragments with old-growth remnants, enabling howler monkeys to recolonize lost territories.

The Spectrum of Healing
Restoration operates across gradients:
- Reclamation stabilizes severely damaged sites (e.g., planting metallophyte grasses on mine tailings to immobilize toxins).
- Rehabilitation revives ecosystem functions without replicating historical conditions (e.g.,

converting eroded cropland to agroforestry).
- True Restoration aims for historical fidelity, like replanting oyster reefs with native *Crassostrea virginica* to filter Chesapeake Bay waters.
- Rewilding restores ecological processes through keystone species reintroductions—wolves regulating elk in Yellowstone triggered riparian woodland recovery.

Human Dimensions: Beyond Ecology
Effective restoration intertwines ecological and social revival. The Loess Plateau transformation in China lifted millions from poverty by restoring terraced watersheds, proving that healed land sustains communities. Indigenous knowledge is indispensable: Māori *iwi* in New Zealand weave traditional practices with modern science to restore coastal *mauri* (life force). Urban projects, like Seoul's Cheonggyecheon River daylighting, show restoration as social medicine—replacing concrete highways with flowing streams reduced city temperatures while creating communal spaces.

Challenges in a Changing World
Restoration confronts novel ecosystems shaped by climate change. Assisted migration—transplanting climate-resilient genotypes—sparks ethical debates. In Australia, coral nurseries propagate heat-tolerant "super corals" for the Great Barrier Reef, yet critics warn of unintended consequences. Scaling restoration requires confronting economic drivers: palm oil deforestation continues even as Indonesia restores peatlands.

The Promise of Regeneration
Global initiatives like the UN Decade on Ecosystem Restoration target 350 million degraded hectares by 2030. Success stories demonstrate restoration's power:
- South Korea's Saemangeum tidal flats, reclaimed from seawalls, now host 500,000 migratory birds.

- Kenya's Mikoko Pamoja project protects mangrove forests that sequester CO_2 while funding schools.

Ultimately, restoration ecology is an act of humility and hope—acknowledging humanity's capacity to harm while harnessing ingenuity to repair. It redefines progress not as conquest of nature, but as reconciliation with life's intricate web. As ecologist Aldo Leopold urged, it is about "living on a piece of land without spoiling it." In healing landscapes, we heal our relationship with Earth itself.

- *"Restoration is not a return to a mythical past, but the cultivation of a functional future where nature and people thrive together." — *Robin Wall Kimmerer, Braiding Sweetgrass.*

58. Look through the text and give its main idea:
The UN Sustainable Development Goals: Humanity's Shared Compass for Survival and Equity

Adopted unanimously by all 193 United Nations member states in 2015, the 17 Sustainable Development Goals (SDGs) represent a revolutionary blueprint for planetary healing and human dignity by 2030. Unlike their predecessors, the Millennium Development Goals, the SDGs recognize that poverty, inequality, environmental collapse, and economic instability are interconnected crises demanding integrated solutions. They reject the false choice between "people versus planet," insisting instead that ecological integrity, social justice, and economic prosperity are mutually dependent. This holistic vision spans five pillars: People (ending poverty, hunger), Planet (climate action, biodiversity), Prosperity (inclusive growth, innovation), Peace (justice, strong institutions), and Partnership (global solidarity).

The SDGs' transformative power lies in their universal applicability. While previous frameworks targeted developing nations, the SDGs acknowledge that wealthy countries must equally transform unsustainable consumption, energy systems, and inequality patterns. Goal 12 (Responsible Consumption) challenges Frankfurt and Phoenix as much as Freetown. Simultaneously, the framework centers equity—Goal 10 explicitly targets reduced inequality within and among nations,

while Goal 5 champions gender equality as a development multiplier. Critically, the SDGs embed planetary boundaries:
- Goal 13 demands urgent climate action
- Goal 14 protects oceans from acidification and overfishing
- Goal 15 halts deforestation and land degradation
- Goal 6 ensures water security for all

These ecological goals are not standalone but interwoven with human well-being. Droughts (Goal 13) exacerbate hunger (Goal 2); pollution (Goal 14) undermines health (Goal 3); land degradation (Goal 15) deepens poverty (Goal 1).

Yet the SDGs face steep challenges. Implementation gaps persist: annual funding shortfalls exceed $4 trillion. Trade-offs emerge—mining for renewable tech (Goal 7) can violate Indigenous rights (Goal 16). Accountability remains voluntary, allowing governments to cherry-pick easy targets. Despite this, the SDGs have mobilized unprecedented action: corporations align with SDG reporting standards; cities redesign around Goal 11 (Sustainable Cities); youth movements demand climate justice (Goal 13).

The goals' legacy rests on recognizing their indivisibility. We cannot achieve zero hunger (Goal 2) without functioning ecosystems (Goals 14-15). Gender equality (Goal 5) accelerates climate resilience. Peace (Goal 16) enables education (Goal 4). In an age of polycrisis, the SDGs offer more than targets—they provide a moral and practical roadmap for co-creating a world where no one, and no ecosystem, is left behind. Their ultimate message: survival is collective.

59. Translate the text

The Circular Economy: Redesigning Prosperity within Planetary Boundaries

The Circular Economy represents a radical reimagining of our industrial metabolism—a systemic shift from the linear "take-make-waste" model to a closed-loop paradigm that eliminates waste, regenerates nature, and decouples economic growth from resource depletion. Unlike recycling alone, it demands redesigning the entire lifecycle of goods: from sourcing and design to use and recovery. This philosophy treats materials as nutrients cycling perpetually through two interconnected spheres: *technical cycles* (polymers, metals, synthetics) and *biological cycles* (organic materials), each governed by distinct restorative principles.

Core Mechanisms of Circulation

Designing for Durability and Disassembly forms the foundation. Products are conceived for longevity, repairability, and modular upgrades—Fairphone smartphones with replaceable components exemplify this. Packaging shifts from single-use plastics to reusable containers (Loop Alliance's returnable jars) or compostable biomaterials (mycelium packaging). Service-based models replace ownership with access: Philips sells "light as a service" to corporations, retaining ownership of fixtures to reclaim materials. Industrial symbiosis transforms waste streams into inputs: a brewery's spent grain becomes bakery flour; heat from data centers warms greenhouses. Critically, digital tools enable this transition—AI optimizes material matching across supply chains; blockchain traces garment recyclability.

Regenerative Foundations

True circularity extends beyond waste reduction to actively rebuild natural capital. Regenerative agriculture restores soil health through cover cropping and no-till farming, sequestering carbon while producing food. Cities mimic forest ecosystems: green roofs absorb stormwater, urban timber construction stores carbon, and wastewater treatment plants harvest phosphorus for fertilizer. This biophilic design acknowledges humans as participants—not conquerors—of biogeochemical cycles.

Economic and Ecological Imperatives

Linear systems hemorrhage value: 95% of plastic packaging ($120 billion/year) becomes waste after one use. Circular strategies unlock trillion-dollar opportunities—remanufacturing electronics saves 50% costs over new production. Simultaneously, they alleviate environmental crises: scaling circular practices could reduce global CO_2 emissions by 39% and virgin resource use by 28% by 2050. Emerging economies leapfrog linear traps—Ghana's Agbogbloshie e-waste hub evolves into a formalized recovery ecosystem.

Barriers and Evolution

Transition challenges include legacy infrastructure (recycling facilities unfit for complex composites), economic lock-ins (subsidized virgin materials), and consumer habits. Policy accelerates change: France's anti-waste law bans unsold goods destruction; the EU's Ecodesign Directive mandates repairability scores. Innovators push frontiers: enzymatic recycling breaks polyester into virgin-grade monomers; lab-grown leather upcycles agricultural waste.

The Circular Economy transcends sustainability—it is a renaissance of harmony between human ingenuity and Earth's rhythms. By transforming waste into worth and extraction into renewal, we forge an economy that thrives not by consuming the world but by nourishing it.

60. Translate the text

The Renewable Energy Transition: Powering Civilization within Planetary Boundaries

The renewable energy transition marks a fundamental reorientation of humanity's relationship with power—shifting from finite, ecologically costly fossil fuels to inexhaustible, clean energy sources harnessed from sunlight, wind, water, and Earth's heat. This transformation is not merely technical but a systemic overhaul of infrastructure, economics, and culture, driven by the urgent need to decarbonize civilization while advancing energy justice and resilience. Unlike coal or oil extraction—which scars landscapes, pollutes watersheds, and destabilizes climate—renewables tap into planetary energy flows that regenerate daily, aligning human activity with Earth's natural rhythms.

Pillars of the New Energy Architecture

Solar photovoltaics convert sunlight directly into electricity, scaling from rooftop panels empowering households to vast solar farms repurposing degraded lands. Wind energy harnesses kinetic air currents through onshore turbines and offshore floating platforms, particularly potent in coastal and Arctic regions. Hydropower leverages river currents and tidal forces, while modern designs minimize ecosystem disruption through "fish-friendly" turbines and dam removals. Geothermal plants tap subterranean heat for both electricity and district heating, and bioenergy—when sourced sustainably from agricultural residues or algae—offers dispatchable power without competing with food crops. Together, these technologies form a diversified portfolio, reducing reliance on single sources and enhancing grid stability.

Beyond Decarbonization: Co-Benefits for People and Planet

Replacing fossil fuels prevents gigatons of CO_2 emissions—critical for limiting warming to 1.5°C—but the transition also delivers cascading benefits. Air pollution declines precipitously: phasing out coal could avert 8 million annual deaths from respiratory diseases. Water stress eases as solar and wind consume 95% less water than coal or nuclear plants. Energy independence strengthens as nations harness local wind and sun, reducing exposure to volatile fuel markets. Distributed renewables empower remote communities: Bangladesh's solar home systems electrified 20 million people without grid expansion. Moreover, renewable projects can regenerate land: solar farms hosting pollinator habitats or agrivoltaics combining crops with overhead panels.

Navigating the Transition Imperative

Acceleration faces material, infrastructural, and equity challenges. Critical minerals (lithium, cobalt) for batteries and panels require responsible mining to avoid ecological harm and labor abuses. Grids need modernization for intermittent sources: smart grids balance supply-demand, while green hydrogen stores surplus energy. A "just transition" must retrain fossil fuel workers and ensure affordable access—avoiding energy poverty as costs shift. Policy levers are essential: ending $7 trillion in annual fossil subsidies, enacting carbon pricing, and mandating renewable portfolio standards. Innovation continues to lower costs: solar electricity now undercuts coal in 90% of markets, and perovskite solar cells promise higher efficiencies with fewer materials.

The Horizon of Renewables

The endgame extends beyond electricity. Electrifying transport, heating, and industry—powered by renewables—completes the decarbonization puzzle. Offshore wind could supply 18 times global electricity demand; geothermal could meet base-load needs indefinitely. By 2050, renewables could power 90% of the global grid, slashing emissions while creating 40 million jobs. This transition redefines prosperity: not through extraction but through harmonization with Earth's energy abundance. As the sun rises each day, the wind sweeps the plains, and rivers flow to the sea,

humanity taps into an inheritance that sustains rather than diminishes the living world. Embracing this shift isn't optional—it's the bridge to a viable future.

9. Материально-техническое и учебно-методическое обеспечение дисциплины

9.1. Перечень основной и дополнительной учебной литературы

Основная литература

1. Сосунова Г. А. Учебник французского языка для таможенников. Часть 2: учебник / Г. А. Сосунова. - Учебник французского языка для таможенников. Часть 2 - Москва: Российская таможенная академия, 2011. - 300 c. - 978-5-9590-0261-9. - Текст: электронный // IPR SMART: [сайт]. - URL: https://www.iprbookshop.ru/69841.html - Режим доступа: по подписке

2. Сосунова Г. А. Французский язык для подготовки специалистов таможенной службы. В 2 частях. Ч.2: учебник / Г. А. Сосунова. - Французский язык для подготовки специалистов таможенной службы. В 2 частях. Ч.2 - Москва: Российская таможенная академия, 2018. - 218 c. - 978-5-9590-1011-9. - Текст: электронный // IPR SMART: [сайт]. - URL: https://www.iprbookshop.ru/93229.html - Режим доступа: по подписке

3. Овсиенко Т. В. Grundstufe Deutsch: учебник немецкого языка / Т. В. Овсиенко, Е. И. Петрова, Л. И. Шаповалова. - Grundstufe Deutsch - Ростов-на-Дону, Таганрог: Издательство Южного федерального университета, 2020. - 217 c. - 978-5-9275-3626-9. - Текст: электронный // IPR SMART: [сайт]. - URL: https://www.iprbookshop.ru/107996.html - Режим доступа: по подписке

4. Орловская И.В. Учебник английского языка для студентов технических университетов и вузов. / И.В. Орловская, Л.С. Самсонова, А.И. Скубриева. - 7-е изд. - Издательство МГТУ им. Н.Э. Баумана, 2007. - 448 - 978-5-7038-2599-0. - Текст: непосредственный.

5. Орловская И.В. Учебник английского языка для студентов технических университетов и вузов / И.В. Орловская, Л.С. Самсонова, А.И. Скубриева. - 8-е изд. - Издательство МГТУ им. Н.Э. Баумана, 2008. - 448 - 978-5-7038-2599-0. - Текст: непосредственный.

Дополнительная литература

1. Бонк Н.А. Учебник английского языка. В 2-х частях. Ч. 1. кн.1, Ч. 1. кн.2, Ч. 2. кн.1, Ч. 2. кн.2. / Н.А. Бонк, Г.А. Котий, Н.А. Лукьянова. - АРТ КПМ, 1994. - Ч. 2. кн.2 302 - 5-86088-031-6. - Текст: непосредственный.

9.2. Профессиональные базы данных и ресурсы «Интернет», к которым обеспечивается доступ обучающихся

Профессиональные базы данных

Не используются.

Ресурсы «Интернет»

1. http://www.homeenglish.ru/Grammar.htm - Английская грамматика на HomeEnglish.ru

2. http://www.native-english.ru/grammar - Практическая грамматика английского языка на Grammar.Sourceword.com - Грамматика английского языка на Native-English.ru

3. https://englishgrammar.org - Английская грамматика с упражнениями

4. http://www.study.ru/support/handbook - Справочник по грамматике английского языка на Study.ru

5. http://study-english.info - Сайт для изучающих английский язык, студентов, преподавателей вузов и переводчиков

6. https://puzzle-english.com - Обучение через фильмы, сериалы и упражнения.

7. https://lingualeo.com - Изучение языка через его различные аспекты

8. https://4lang.ru - Бесплатный тренажёр для изучения слов.

9. https://www.multitran.com - Словарь общеупотребительной и терминологической лексики

10. https://dic.academic.ru - Словари и энциклопедии (в то числе словари терминологической лексики)

11. https://onelook.com - Толковые словари английского языка (толкование, употребление, произношение, коллокации)

9.3. Программное обеспечение и информационно-справочные системы, используемые при осуществлении образовательного процесса по дисциплине

Перечень программного обеспечения
(обновление производится по мере появления новых версий программы)
Не используется.

Перечень информационно-справочных систем
(обновление выполняется еженедельно)
Не используется.

9.4. Оборудование и технические средства обучения

Учебная аудитория
ТВ - 1 шт.

10. Методические указания по освоению дисциплины (модуля)

С целью успешного освоения данного предмета студенту необходимо выполнять домашние работы по указанным преподавателям темам и представленным на занятиях материалам. Для более успешного выполнения работы студенту предлагается использование учебно-методических материалов, соответствующих указанной теме.

Самостоятельная работа студентов описывается и регулируется:
- Методическими рекомендациями по дисциплине;
- Методическими рекомендациями по организации самостоятельной работы студентов МИИГАиК.

Методические рекомендации студентам по освоению дисциплины
Самостоятельная работа студентов проводится под руководством преподавателя и подразумевает изучение теоретического материала и контроль его усвоения, подготовку пересказов текстов и создание самостоятельных оригинальных рассказов и презентаций по темам, изучаемым в рамках учебной дисциплины, подготовку и перевод текстов, выполнение различных грамматических, лексических, лексико-грамматических упражнений.
Методика самостоятельной работы предварительно разъясняется преподавателем и в последующем может уточняться с учетом индивидуальных особенностей студентов. Время и место самостоятельной работы выбираются студентами по своему усмотрению с учетом рекомендаций преподавателя.
Самостоятельная работа студентов проводится под руководством преподавателя и подразумевает изучение теоретического материала и контроль его усвоения, подготовку пересказов текстов и создание самостоятельных оригинальных рассказов и презентаций по темам, изучаемым в рамках учебной дисциплины, подготовку и перевод текстов, выполнение различных грамматических, лексических, лексико-грамматических упражнений.
Методика самостоятельной работы предварительно разъясняется преподавателем и в

последующем может уточняться с учетом индивидуальных особенностей студентов. Время и место самостоятельной работы выбираются студентами по своему усмотрению с учетом рекомендаций преподавателя.
При подготовке к практическим занятиям, руководствуясь планом и списком рекомендуемой литературы, необходимо изучить тему так, чтобы по каждому из предложенных вопросов студент мог дать развернутый, обстоятельный ответ.
Внеаудиторная самостоятельная работа студентов включает:
- Работа над конспектом лекции
- Подготовка к практическому занятию
- Доработка конспекта лекции с применением учебника, методической литературы, дополнительной литературы
- Подбор, изучение, анализ и конспектирование рекомендованной литературы
- Самостоятельное изучение отдельных тем, параграфов
- Подготовка к экзамену
Для успешного освоения учебной дисциплины и достижения поставленных целей необходимо внимательно ознакомиться с настоящей рабочей программой учебной дисциплины. Ее может представить преподаватель на вводном занятии или самостоятельно обучающийся использует информацию на официальном Интернет-сайте Университета.
Следует обратить внимание на список основной и дополнительной литературы, которая имеется в электронной библиотечной системе Университет, на предлагаемые преподавателем ресурсы информационно-телекоммуникационной сети Интернет.
Методические рекомендации при работе над конспектом лекций
В ходе лекционных занятий необходимо вести конспектирование учебного материала. Обращать внимание на категории, формулировки, раскрывающие содержание тех или иных явлений и процессов, научные выводы и практические рекомендации, положительный опыт в ораторском искусстве. Желательно оставить в рабочих конспектах поля, на которых делать пометки из рекомендованной литературы, дополняющие материал прослушанной лекции, а также подчеркивающие особую важность тех или иных теоретических положений. Задавать преподавателю уточняющие вопросы с целью уяснения теоретических положений, разрешения спорных ситуаций.
Важно развивать умение сопоставлять источники, продумывать изучаемый материал.
Большое значение имеет совершенствование навыков конспектирования .
Преподаватель может рекомендовать студентам следующие основные формы записи: план (простой и развернутый), выписки, тезисы.
Результаты конспектирования могут быть представлены в различных формах.
План – это схема прочитанного материала, краткий (или подробный) перечень вопросов, отражающих структуру и последовательность материала. Подробно составленный план вполне заменяет конспект.
Конспект – это систематизированное, логичное изложение материала источника. Различаются четыре типа конспектов:
• План-конспект – это развернутый детализированный план, в котором достаточно подробные записи приводятся по тем пунктам плана, которые нуждаются в пояснении.
• Текстуальный конспект – это воспроизведение наиболее важных положений и фактов источника.
• Свободный конспект – это четко и кратко сформулированные (изложенные) основные положения в результате глубокого осмысливания материала. В нем могут присутствовать выписки, цитаты, тезисы; часть материала может быть представлена планом.
• Тематический конспект – составляется на основе изучения ряда источников и дает более или менее исчерпывающий ответ по какой-то схеме (вопросу).
Виды и формы отработки пропущенных занятий
Студент, пропустивший занятия, обязан побеседовать с преподавателем по пропущенной теме, показать выполнение в тетради письменных заданий. Устные темы сдаются в обязательном порядке после аудиторных занятий.

Описание возможностей изучения дисциплины лицами с ОВЗ и инвалидами

При необходимости обучения студентов-инвалидов и лиц с ограниченными возможностями здоровья аудиторные занятия могут быть заменены или дополнены изучением полнотекстовых лекций, презентаций, видео- и аудиоматериалов в электронной информационно-образовательной среде (ЭИОС) университета. Индивидуальные задания подбираются в адаптированных к ограничениям здоровья формах (письменно или устно, в форме презентаций). Выбор методов обучения зависит от их доступности для инвалидов и лиц с ограниченными возможностями здоровья.

Рабочая программа дисциплины для инвалидов и лиц с ограниченными возможностями здоровья разрабатывается индивидуально с учетом особенностей психофизического развития, индивидуальных возможностей и состояния здоровья таких обучающихся.