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УПРАВЛЕНИЕ ДИСТАНЦИОННОГО ОБУЧЕНИЯ И ПОВЫШЕНИЯ КВАЛИФИКАЦИИ

Кафедра «Научно-технический перевод и профессиональная коммуникация»

УЧЕБНО-МЕТОДИЧЕСКОЕ ПОСОБИЕ

по английскому языку

«Aquaculture»

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Аннотация

Данное учебное пособие предназначено для студентов специальности 111400 «Водные биоресурсы и аквакультура», изучающих английский язык, а также для студентов, получающих дополнительное образование в сфере профессиональных коммуникаций.

Цель пособия – расширение активного словарного запаса, приобретение навыков профессионально-ориентированного чтения и коммуникации на английском языке. Тексты, представленные в пособии, отражают современные взгляды на основные тенденции в аквакультуре и взяты из аутентичных источников.

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Оглавление

UNIT 1 HYDROBIOLOGY AND HYDROLOGY

Glossary

lotic - проточный (о воде);
lentic - непроточный, стоячий (водоём);
assemblage - скопление, сосредоточение;
loop – петля;
waterbloom - "цветение" воды;
turnover lake - обновление воды в озере;
acidification – окисление;
ionic composition – ионная структура;
fertilisation (fertilization) - удобрение почвы, внесение удобрений;
elucidation - объяснение, истолкование, трактовка;
water supply - водоснабжение, водоподача;
sewage treatment – очистка (обработка) сточных вод;
waterpurification - очистка воды, водоочистка;
biotic communities- биоценоз;
EU directive — директива Евросоюза;
distribution – распределение, раздача;
hydrologic cycle = water cycle – круговорот воды, влагооборот;
ecological/environmental sustainability — экологическая устойчивость, устойчивость окружающей среды;
watershed - водораздел, бассейн реки;
drainagebasin - бассейн (реки), водосбор, (водосборный) бассейн;
environmental engineering - техническая экология, технические средства и методы охраны окружающей среды.

Ex.1. Check the transcription in the dictionary and read the words below. Guess the meaning of these words.

Hydrobiology, hydrobiologists, hydrology, sub-discipline, sphere, taxonomy, physiology, morphology, aquatic, limnology, modern, eutrophication, biotic, microbial, phosphorus, mechanism, ionic composition, utilise (utilize), to classify, geology, hydrometeorology, oceanography.

Ex.2. Match the synonyms in both columns.

1) long-term	a) sphere , field
2) modern	b) flowing water
3) distinguishing	c) still water
4) lotic water	d) important
5) lentic water	e) to affect
6) significant	f) currant, up-to-date
7) toinfluence	g) long-dated
8) research	h) purpose, aim
9) to carry out	i) explanation , interpretation
10) goal	j)study
11) elucidation	k) to perform, to do
12) domain	l) distinctive, specific

Ex.3. Replace the Russian words with their English equivalents and translate the sentences.

1. (Сточные воды) treatment is the process that removes the majority of the contaminants from waste-water or sewage. 2. (Лимнология) is the study of bodies of fresh water with reference to their plant and animal life, physical properties, geographical features. 3. Environmental engineering is (применение) of science and engineering principles to improve the natural environment, to provide healthy water, air and land for human habitation and for other organisms. 4.Engineers and scientists evaluate the water balance within a (водораздел) and determine the available (водоподача).5. Long-term studies are carried out on changes in the ionic composition of the water of rivers, lakes and reservoirs in connection with (кислотный) rain and (удобрение почвы).

Ex.4. Read the text and answer the questions.

Hydrobiology is the science of life and life processes in water. Much of modern hydrobiology can be viewed as a sub-discipline of ecology but the sphere of hydrobiology includes taxonomy, economic biology, industrial biology, morphology, physiology etc. The one distinguishing aspect is that all relate to aquatic organisms. Much work is closely related to limnology and can be divided into lotic system ecology (flowing waters) and lentic system ecology (still waters).

One of the significant areas of current research is eutrophication. Special attention is paid to biotic interactions in plankton assemblage including the microbial loop, the mechanism of influencing water blooms, phosphorus load and lake turnover. Another subject of research is the acidification of mountain lakes. Long-term studies are carried out on changes in the ionic composition of the water of rivers, lakes and reservoirs in connection with acid rain and fertilisation. One goal of current research is elucidation of the basic environmental functions of the ecosystem in reservoirs, which are important for water quality management and water supply.

Much of the early work of hydrobiologists concentrated on the biological processes utilised in sewage treatment and water purification. Other historically important work sought to provide biotic indices for classifying waters according to the biotic communities that they supported. This work continues to this day in Europe in the development of classification tools for assessing water bodies for the EU water framework directive.

Hydrology is the study of the movement, distribution, and quality of water on Earth and other planets, including the hydrologic cycle, water resources and environmental watershed sustainability. A practitioner of hydrology is a hydrologist, working within the fields of earth or environmental science, physical geography, geology or civil and environmental engineering.

Domains of hydrology include hydrometeorology, surface hydrology, hydrogeology, drainage basin management and water quality, where water plays the central role. Oceanography and meteorology are not included because water is only one of many important aspects within those fields. Hydrological research can inform environmental

engineering, policy and planning.

[http://en.wikipedia.org;]

Questions:

1. What is the main difference between hydrobiology and hydrology?

2. What scientific areas does hydrobiology include?

3. What are the main subjects of research in hydrobiology?

4. What did hydrobiologists concentrate their early work on?

5. What areas does hydrology include?

6. How are hydrology and hydrobiology connected with each other?

Ex. 5. Match two columns to make collocations and translate them.

A collocation is two or more words that often go together.

1)	to pay	a)	directive
2)	to carry out	b)	rain
3)	EU	c)	the role
4)	to play	d)	engineering
5)	acid	e)	treatment
6)	environmental	f)	attention
7)	sewage	g)	study (research)

Find all the collocations with the word "water" in the text. Write them down and translate.

water _____ *water* _____ *water* _____

water _____ *water* _____ *water* _____

Ex.6. Complete the sentences using the collocations from ex.5.

1. _____ can have harmful effects on plants, aquatic animals and infrastructure.
2. Scientists at this university _____ on surface hydrology.
3. _____ is the process of removing contaminants from wastewater.
4. People should _____ to environmental protection.
5. _____ is a legislative act of the European Union.
6. Ancient Romans had a good _____ as they built a system of aqueducts and pipes.
7. The main cause of _____ is sulfur and nitrogen compounds from human sources, such as electricity generation, factories, and motor vehicles.
8. Specialists in the sphere of _____ study the effect of technological advances on the environment.

Ex.7. Complete the sentences with the words from the box.

sustainability	science	purification	hydrologic
lentic	acidification	watershed	

1. Taxonomy is a _____ of identifying and naming species and arranging them into a classification.
2. There are loticwaters and_____ waters.
3. In North America, the term _____ is commonly used to mean a drainage basin.
4. The _____ cycle describes the continuous movement of water on, above and below the surface of the Earth.
5. Environmental _____ is how biological systems endure and remain diverse and productive.
6. Ocean _____ is the ongoing decrease in the pH of the Earth's oceans, caused by the uptake of carbon dioxide (CO2) from the atmos- phere.

7. Water _____ is the process of removing undesirable chemicals, biological contaminants, solids and gases from contaminated water.

Grammar. Revision of Passive Voice.

to be + Past Participle

Present Simple	**am** **is** **are**	**Participle II** **(Verb-ed; Verb 3)**
Past Simple	**was** **were**	
Future Simple	**will be**	
Present Progressive	**am being** **is being** **are being**	
Past Progressive	**was being** **were being**	
Present Perfect	**have been** **has been**	
Past Perfect	**had been**	

Have fun!

Ex.8. Read and enjoy the joke, underline the verbs in the Passive Voice.

A Different Kettle of Fish

Jack was telling me, the other day, what a wonderful place Paris is.

– Just think, he said, the moment you set foot in Paris you are looked after and taken care of at the station. You're expected to choose one of the luxurious cars that are waiting for you. Next you are driven to an expensive hotel where a room has already been booked for you. By the way, all the time you're invited to go and see your new friends in their flats. Anything you choose to eat or drink is paid for…, in the morning you're presented with flowers and at night you're driven to the best night clubs, where you can dance and drink till the small hours of the morning unless you prefer to take a walk by moonlight in some private garden.

I must say Jack's story came as a complete surprise to me. To be quite truthful I could hardly believe my eyes!

- How do you know?! – I burst out. – Have you been to Paris?
- No, I haven't, said Jack, but my wife has!
- Well, I said, that's rather a different kettle of fish.

Ex. 8. Write the verbs in brackets in the correct form of Passive voice and translate the sentences. Pay attention to the use of Passive Voice with modal verbs.

1. Much of modern hydrobiology can _____ as a subdiscipline of ecology but the sphere of hydrobiology includes taxonomy, economic biology, industrial biology, morphology, physiology etc. (to view)

2. A lot of species _____ in this pond last year. (to find)

3. Long-term studies _____ out on changes in the ion-

ic composition of the water of rivers now. (to carry)

4. Special attention _____ to biotic interactions in plankton assemblage (to pay).

5. Much of the early work _____ on the biological processes utilised in sewage treatment and water purification. (to base)

6. Much work is closely related to limnology and can _____ into lotic system ecology and system ecology. (to divide)

7. Oceanography and meteorology _____in hydrology. (not to include).

8. Fish farmers used modern breeding methods that _____ before. (not to use)

9. Serious research _____ by hydrologists lately. (to do)

10. _____ sewage treatment in this region _____ next year? (to improve)

UNIT 2 AQUATIC ECOSYSTEMS AND AQUACULTURE

TEXT 1
Aquatic ecosystems

Glossary:

benthic – бентический, относящийся ко дну водоема
estuary – устье реки, дельта
freshwater ecosystem – пресноводная экосистема
intertidal – расположенный между приливом и отливом
introduced species - интродуцированный, или чужеродный вид - некоренной, несвойственный для данной территории, преднамеренно или случайно завезённый на новое место в результате человеческой деятельности.
Littoral zone – литоральная или прибрежная зона
marine ecosystem – морская экосистема
pool - омут; заводь; водоём со стоячей водой
pond - искусственный водоём, бассейн, запруда
saltmarsh - солончак; низина, затопляемая морской водой
species –биологический вид
wetlands – болота

Ex.1 Read and translate the following text.

http://en.wikipedia.org/wiki/File:Estuary-mouth.j
An estuary mouth and coastal w aters, part of an aquatic ecosystem

An aquatic ecosystem is an ecosystem in a body of water. Communities of organisms that are dependent on each other and on their environment live in aquatic ecosystems. The two main types of aquatic ecosystems are marine ecosystems and freshwater ecosystems.

Marine ecosystems cover approximately 71% of the Earth's surface and contain approximately 97% of the planet's water. They generate 32% of the world's net primary production. They are distinguished from freshwater ecosystems by the presence of dissolved compounds, especially salts, in the water. Marine ecosystems can be divided into many zones depending upon water depth and shoreline features. The oceanic zone is the vast open part of the ocean where animals such as whales, sharks, and tuna live.

The benthic zone consists of substrates below water where many invertebrates live. The intertidal zone is the area between high and low tides. Other near-shore zones can include estuaries, salt marshes, coral reefs, lagoons and mangrove swamps. Fishes caught in marine ecosystems are the biggest source of commercial foods obtained from wild populations.

Freshwater

http://en.wikipedia.org/wiki/File:Panorama_presa_las_ni%C3%B1as_mogan_gran_canaria.j

Freshwater ecosystem.

Freshwater ecosystems cover 0.80% of the Earth's surface and inhabit 0.009% of its total water. They generate nearly 3% of its net primary production. Freshwater ecosystems contain 41% of the world's known fish species.

There are three basic types of freshwater ecosystems:

- Lentic: slow moving water, including pools, ponds, and lakes.
- Lotic: faster moving water, for example streams and rivers.
- Wetlands: areas where the soil is saturated or inundated for at least part of the time.

Lentic

Lakeecosystem

http://en.wikipedia.org/wiki/File:Primary_zones_of_a_lake.p

The three primary zones of a lake.

Lake ecosystems can be divided into zones. One common system divides lakes into three zones (see figure). The first, the littoral zone, is the shallow zone near the shore. This is where rooted wetland plants occur. The offshore is divided into two further zones, an open water zone and a deep water zone. In the open water zone (or photic zone) sunlight supports photosynthetic algae, and the species that feed upon them. In the deep water zone, sunlight is not available and the food web is based on detritus entering from the littoral and photic zones. The production of the lake as a whole is the result of production from plants growing in the littoral zone, combined with

production from plankton growing in the open water.

Wetlands can be part of the lentic system, as they form naturally along most lakeshores, the width of the wetland and littoral zone being dependent upon the slope of the shoreline and the amount of natural change in water levels, within and among years. Often dead trees accumulate in this zone, either from windfalls on the shore or logs transported to the site during floods. This woody debris provides important habitat for fish and nesting birds, as well as protecting shorelines from erosion.

Two important subclasses of lakes are ponds, which typically are small lakes that intergrade with wetlands, and water reservoirs. Over long periods of time, lakes, or bays within them, may gradually become enriched by nutrients and slowly fill in with organic sediments, a process called succession. When humans use the watershed, the volumes of sediment entering the lake can accelerate this process. The addition of sediments and nutrients to a lake is known as eutrophication.

Ponds

Ponds are small bodies of freshwater with shallow and still water, marsh, and aquatic plants. They can be further divided into four zones: vegetation zone, open water, bottom mud and surface film. The size and depth of ponds often varies greatly with the time of year; many ponds are produced by spring flooding from rivers. Food webs are based both on free-floating algae and upon aquatic plants. There is usually a diverse array of aquatic life, with a few examples including algae, snails, fish, beetles, water bugs, frogs, turtles, otters and muskrats.

Lotic

River ecosystem

The major zones in river ecosystems are determined by the river bed's gradient or by the velocity of the current. Faster moving turbulent water typically contains greater concentrations of dissolved oxygen, which supports greater biodiversity than the slow moving water of pools. These distinctions form the basis for the division of rivers into upland and lowland rivers. The food base of streams within riparian forests is mostly derived from the trees, but wider streams and those that lack a canopy derive the majority of their food base from algae. Anadromous fish are also an important source of nutrients. Environmental threats to rivers include loss of water, dams, chemical

pollution and introduced species. A dam produces negative effects that continue down the watershed. The most important negative effects are the reduction of spring flooding, which damages wetlands, and the retention of sediment, which leads to loss of deltaic wetlands.

Wetlands

Wetlands are dominated by vascular plants that have adapted to saturated soil. There are four main types of wetlands: swamp, marsh, fen and bog (both fens and bogs are types of mire). Wetlands are the most productive natural ecosystems in the world because of the proximity of water and soil. Hence they support large numbers of plant and animal species. Due to their productivity, wetlands are often converted into dry land with dykes and drains and used for agricultural purposes. The construction of dykes and dams has negative consequences for individual wetlands and entire watersheds. Their closeness to lakes and rivers means that they are often developed for human settlement. Once settlements are constructed and protected by dykes, the settlements then become vulnerable to land subsidence and ever increasing risk of flooding. The Louisiana coast around New Orleans is a well-known example; the Danube Delta in Europe is another. [www.wikipedia.org]

Ex.2. Fill in the gaps with the following words:

oceanic, marine, benthic, intertidal, wetlands, freshwater

1. 41% of the world's known fish species live in _____ ecosystems.
2. _____ ecosystems contain the greater volume of the planet's water.
3. A lot of invertebrates live in the _____ zone.
4. The open part of the ocean is called the _____ zone.
5. The _____zone occupies the area between high and low tides
6. In _____ the soil is saturated.

Ex.3.Use the following prepositions in the sentences:

from, into, of, from, by, into, on

1. Organisms living in aquatic ecosystems are dependent ____ each other.
2. A marine ecosystem is distinguished ____ a freshwater ecosystem by the presence of salts in the water.
3. Freshwater ecosystems can be divided _____ three basic types.
4. Marine ecosystems consist _____ many zones depending upon water depth and shoreline features.
5. People use marine ecosystems as the source of food obtained ____ wild population.
6. Wetlands are dominated ___ plants adapted to saturated soil.
7. Because of their productivity, wetlands are often converted ____ into dry land.

Ex.4 Answer the questions to the text:

1. What are the two main types of aquatic ecosystems?
2. Which of them contains the greater part of the planet's water?
3. Which ecosystems present the biggest source of commercial foods for people?
4. What types of freshwater ecosystems exist?
5. What aquatic life can be seen in ponds?
6. How is the process of the addition of sediments and nutrients to a lake called?
7. Do dams present environmental threats to rivers?
8. Why are wetlands considered to be the most productive natural ecosystems in the world?
9. How many types of wetlands are there? What are they?

Grammar revision

Participle

В английском языке различают два причастия: причастие I и причастие II. Причастие II является страдательным причастием прошедшего времени:

e.g. grown – выращенный.

Причастие I имеет одну простую и три сложных формы.

	Active	Passive
Simple	growing (выращивая, выращивающий)	beinggrown (выращиваемый, будучи выращенным)
Perfect	having grown (вырастив)	havingbeengrown (после того, как вырастили; когда вырастили; так как вырастили)

Простая форма указывает на то, что действие, выраженное причастием, происходит одновременно с действием, выраженным сказуемым.

Перфектная форма причастия I указывает на то, что действие, выраженное причастием, предшествовало действию, выраженному сказуемым.

Причастие I в страдательном залоге выражает действие, которое испытывает на себе лицо или предмет. На русский язык обороты со сложными формами причастия переводятся обычно придаточными обстоятельственными предложениями с союзами *когда, так как, после того как и т.д.*

The Participial Constructions

Причастные обороты

Причастия вместе с относящимися к ним словами образуют причастные обороты. Сочетание существительного или местоимения в объектном падеже с причастием настоящего или прошедшего времени представляет собой объектный причастный оборот.

1. Объектный причастный оборот – The Objective Participial Construction – употребляется после глаголов *to see, to hear, to feel, to find, to keep, to notice и т.д.*

В предложении этот оборот выступает в функции сложенного дополнения и обычно переводится на русский язык придаточным предложением.

e.g. He saw *the students working* in the laboratory.

2. Абсолютный причастный оборот - The Absolute Participial Construction – представляет собой сочетание причастия с существительным в общем падеже, которое является субъектом действия, выраженного причастием. На русский язык данный оборот переводится придаточным предложением с союзами *так как, после того, как, если, когда*. Если оборот стоит в конце предложения, то он переводится самостоятельным предложением с союзами *а, причем, в то время как.*

e.g. With research involving more and more people, the profession of a scientist has become one of the most popular nowadays. – Так как научные исследования вовлекают все больше и больше людей, сегодня профессия ученого стала одной из самых популярных.

Fish need dissolved oxygen to survive, the intolerance to low oxygen varying among species. - Для выживания рыбам нужен растворенный кислород, причем их переносимость низкого уровня кислорода в воде варьируется в зависимости от вида.

Ex.1 Analyze the use of Participles I and II in the following sentences and translate them.

1. The vast majority of fish released from hatcheries soon after hatching became food for other species.

2. The majority of aquatic animals currently being cultured for

human food are animals and most are members of one of only three phyla: Mollusca, Arthropoda or Chordata.

3. The most lucrative market is Japan where sushi-grade tuna brings extremely high prices depending upon the quality of the individual fish.

4. Seaweeds are cultured in the marine waters adjacent to most continents, with the largest amount of activity occurring in Asia.

5. While not used for human consumption, there are aquaculturalists who specialize in growing water lilies.

6. There are environmental concerns with such systems as inland ponds, flow-through systems, and closed systems, but they generally have fewer environmental problems overall, especially when properly managed.

7. Shrimp is mostly farmed in tropical areas, with production controlled by multinational corporations.

[Aquaculture: an introductory text /Robert R. Stickney. – 2- nd ed., UK 2009]

Ex.2 Find Participles I and II in Text 1, define their forms and translate them into Russian.

TEXT 2

Functions of Aquatic ecosystems and Abiotic characteristics

Glossary:

abundance - изобилие
algae - водоросль
algaculture – выращиваниеводорослей
aquaponics – аквапоника
crustaceans - членистоногие
eutrophication - этрофикация
fishery – рыболовство, рыбный промысел
flooding - затопление
habitat – среда обитания
harvesting – собирать урожай
irrigation - орошение, ирригация
nutrient – питательное вещество
oyster – устрица
reservoir - резервуар, во- дохранилище

salinity – соленость
saturate – насыщать, пропитывать
sediment - отстоявшийся слой, осадок , отложение
seaweed -водоросли
shallow – мелкий, мелководный
shrimp - креветка

Ex.1 Read and translate the following text.

Aquatic ecosystems perform many important environmental functions. For example, they recycle nutrients, purify water, attenuate floods, recharge ground water and provide habitats for wildlife. Aquatic ecosystems are also used for human recreation, and are very important to the tourism industry, especially in coastal regions.

The health of an aquatic ecosystem is degraded when the ecosystem's ability to absorb a stress has been exceeded. A stress on an aquatic ecosystem can be a result of physical, chemical or biological alterations of the environment. Physical alterations include changes in water temperature, water flow and light availability. Chemical alterations include changes in the loading rates of biostimulatory nutrients, oxygen consuming materials, and toxins. Biological alterations include over-harvesting of commercial species and the introduction of exotic species. Human populations can impose excessive stresses on aquatic ecosystems. There are many examples of excessive stresses with negative consequences. Consider the following. The environmental history of the Great Lakes of North America illustrates this problem, particularly how multiple stresses, such as water pollution, overharvesting and invasive species can combine.

An ecosystem is composed of biotic communities that are structured by biological interactions and abiotic environmental factors. Some of the important abiotic environmental factors of aquatic ecosystems include substrate type, water depth, nutrient levels, temperature, salinity, and flow. It is often difficult to determine the relative importance of these factors without rather large experiments.

The amount of dissolved oxygen in a water body is frequently the key substance in determining the extent and kinds of organic life in the water body. Fish need dissolved oxygen to survive, although their tolerance to low oxygen varies among species; in extreme cases of low oxygen some fish even resort to air gulping. Nutrient levels are important in controlling the abundance of many species of algae. The relative abundance of nitrogen and phosphorus can affect determine

which species of algae come to dominate. Algae are a very important source of food for aquatic life, but at the same time, if they become over-abundant, they can cause declines in fish when they decay. Similar over-abundance of algae in coastal environments such as the Gulf of Mexico produces, upon decay, a hypoxic region of water known as a dead zone.

The salinity of the water body is also a determining factor in the kinds of species found in the water body. Organisms in marine ecosystems tolerate salinity, while many freshwater organisms are intolerant of salt. The degree of salinity in an estuary or delta may is an important control upon the type of wetland , and the associated animal species. Dams built upstream may reduce spring flooding, and reduce sediment accretion, and may therefore lead to saltwater intrusion in coastal wetlands.

Freshwater used for irrigation purposes often absorb levels of salt that are harmful to freshwater organisms.

Ex.2 Match the words from group A with words from group B having similar meaning.

A. to degrade, alteration, biotic, key, to resort, to decline, tolerant, to determine, to compose

B. deformation, main, to spoil, resistant, abiotic, to decide, to consist, to decay, to start

Ex.3 Answer the following questions

1. What environmental functions do aquatic ecosystems have?
2. How do people use aquatic systems?
3. Alterations of the environment influence an aquatic system , don't they? How?
4. What does an aquatic system consist of?
5. What factors determine the survival of fish?
6. What factors are dangerous for freshwater organisms?

TEXT 3

Aquaculture

According to the Food and Agriculture Organization of the United Nations (FAO), aquaculture is understood to mean the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated.

Aquaculture involves cultivating freshwater and saltwater populations under controlled conditions, and can be contrasted with commercial fishing, which is the harvesting of wild fish. Mariculture refers to aquaculture practiced in marine environments and in underwater habitats.

Particular kinds of aquaculture include fish farming, shrimp farming, oyster farming, algaculture (such as seaweed farming), and the cultivation of ornamental fish. Particular methods include aquaponics and Integrated multi-trophic aquaculture, both of which integrate fish farming and plant farming.

Global aquaculture production is growing rapidly, with production more than doubling in weight and by value from 1989 to 2000. With many capture fisheries catches peaking, scientists, governments, and international organizations all point to aquaculture as the most important means to increase global fish supplies.

Ex.1. Answer the questions to the text.

1. How can you define the term "aquaculture"?
2. What does aquaculture involve?
3. What kinds of aquaculture do you know?
4. Aquaculture production is growing in the world, isn't it?

Ex.2. Match the aquaculture terms with their definitions.

Aquaculture

1. Aquaculture	a. the process by which a body of water becomes enriched with organic material from algae and other primary producers (e.g., photosynthetic organisms).
2. Eutrophication	b. aquaculture operations located in an exposed, open-ocean environment.
3. Mariculture	c. a form of aquaculture involving the farming of species of macroalgae, commonly known as seaweed.
4. Offshore aquaculture	d. the farming of aquatic organisms, including finfish, shellfish (mollusks and crustaceans), and aquatic plants.
5. Recirculating systems	e. saltwater aquaculture, including coastal and offshore aquaculture operations +as well as saltwater pond and tank systems.
6. Algaculture	f. a food production system that combines conventional aquaculture with hydroponics (cultivating plants in water) in a symbiotic environment.
7. Aquaponics	g. enclosed aquaculture ponds or tanks that clean and recycle water.

UNIT 3 HISTORICAL OVERVIEW

Glossary:

depleted - истощенный
foraging – добычапищи
terrestrial lfarming – наземное фермерство
terrain - ландшафт
toconsume – потреблять
floodplains – пойма реки
dams – дамбы; плотины
seaweed – морская водоросль
bamboo poles – бамбуковые шесты
oyster shells – ракушка (устриц)
fishponds – рыбоводный пруд
rainbow trout – радужная форель
hatchery– питомник; рыбоводный завод
kelp – бурая водоросль
stagnation – застой
anchoring surfaces – поверхность для приклеивания (спор)
breeding in captivity – выращивание в неволе

Ex.1. Look up the following words in a dictionary and check their pronunciation.

protein, sustenance, sufficient, aquatic, to rely on, approximately, percent, unfamiliar, capture, subsided, emergence, cultivate, perish, available, supply.

Ex.2. Read and translate the text.

Introduction

While the world community has only recently viewed aquaculture as a potential solution to the dilemma of depleted oceans, it is by no means a new practice. Some sources say the advent of aquaculture dates back millennia, though its exact origins are unknown. It most likely grew out of necessity –foraging and hunting were not sufficient to provide a stable source of food to local communities. While there are many parallels to agriculture, the development of aquaculture has progressed more slowly than terrestrial farming because of the unfamiliar nature of the ocean terrain and characteristics of aquatic organisms.

A large proportion of organisms that humans rely on for pro-

tein and sustenance come from the sea. Currently, approximately 16 percent of animal protein consumed by the world's population is derived from fish, and over one billion people worldwide depend on fish as their main source of animal protein. No wonder that the humanity started fishing and developing fish farming from the ancient times.

Ancient times

The roots of aquaculture trace back 4,000 years to China where carp were cultured. The earliest known written record of fish culture techniques is attributed to Fan Li, of China, who in 475 B.C.E. described propagation methods, pond construction, and growth characteristics of common carp. When the waters subsided after river floods, some fishes, mainly carp, were trapped in lakes. A fortunate genetic mutation of carp led to the emergence of goldfish during the Tang Dynasty. Japanese cultivated seaweed by providing bamboo poles and, later, nets and oyster shells to serve as anchoring surfaces for spores.

From those early beginnings to the present, common carp is the best understood of all aquaculture species. Common carp reportedly were grown in Europe 2,000 years ago, and, although the ancient Greeks and Romans held fish in ponds, more advanced techniques for breeding and growing fish in managed environments in Europe were first devised 1,000 years ago.

The Japanese, Polynesian Hawaiians, and Mayans were also early practitioners of fish culture.

Further development

In central Europe, early Christian monasteries adopted Roman aquacultural practices. Aquaculture spread in Europe during the Middle Ages since away from the seacoasts and the big rivers fish had to be salted in order not to perish. Improvements in transportation during the 19th century made fresh fish easily available and inexpensive, even in inland areas, making aquaculture less popular.

Hawaiians constructed oceanic fish ponds. A remarkable example is a fish pond dating from at least 1,000 years ago, at Alekoko. Legend says that it was constructed by the mythical Menehune dwarf people.

In the United States, nineteenth-century scientists developed techniques for breeding rainbow trout in captivity. Californians harvested wild kelp and attempted to manage supply circa 1900, later labeling it a wartime resource.

It was not until after World War II that aquaculture gained much attention as a potentially large-scale industry. A shift in economic conditions in developed nations of the world led to an increase

in the demand for fish such as salmon, shrimp, eels, and sea basses, all of which can be produced profitably through aquaculture. In the 1960's, aquaculture became a significant commercial practice in Asia where it had mainly been used as a small-scale means of local community food production for thousands of years. Worldwide consumption of fish as food has risen from 40 million tons in1970 to 86 million tons in 1998.

In the last few decades, worldwide aquaculture production has increased significantly. In 1970 aquaculture operations composed 3.9 percent of all fish production, compared to 27.3 percent in 2000. Worldwide, total fish production from aquaculture operations has increased steadily at a rate of 9.2 percent per year.

Modern Aquaculture

At the beginning of the twenty-first century, aquaculture's share of total fish production worldwide was 25 percent, and that proportion is projected to increase. About 430 (97%) of the species cultured as of 2007 were domesticated during the 20th century, of which an estimated 106 came in the decade to 2007. Harvest stagnation in wild fisheries and overexploitation of popular marine species, combined with a growing demand for high quality protein, encourage aquaculturists to domesticate other marine species.

[1. http://en.wikipedia.org;

2. http://www.waterencyclopedia.com/A-Bi/Aquaculture.html;

3. At a Crossroads: Will Aquaculture Fulfill the Promise of the Blue Revolution? A SeaWeb Aquaculture Clearinghouse report by Kathryn White, Brendan O'Neill, and ZdravkaTzankovhttp: //www.aquacultureclearinghouse.org/]

Ex. 3. Answer the questions to the text.

1. Why is fish farming so important for the humanity?
2. Why has the development of aquaculture progressed more slowly than agriculture?
3. What fish species were cultured in ancient times?
4. What countries developed aquaculture techniques?
5. What period of time shows the greatest interest in aquaculture?

Ex. 4. Match the following words and underlined words in the text to make synonym pairs.

change -
to get -
enough -
greatly -
to rise, to grow -
about -
appearance –
progressive, modern

Ex. 5. Match two columns to make phrases from the text. Find them in the context and translate.

1. oyster	a) mutation
2.depleted	b) pond
3. aquatic	c) terrain
4.ocean	d) shells
5.marine	e) species
6. genetic	f) organisms
7. fish	g) oceans

Grammar. Word-building.

Ex.6. Find in the text all the words derived from the word "aqua". What parts of speech are they?

Aqua_____

Aqua_____

Aqua_____

Aqua_____

Ex. 7. Write the suffixes into the write columns according to the rules of word-formation.

- tion, -al, -ate, - able, -ity, -ic, -ing, -ly, - ment, - ence, -ed, -ial.

Noun	Verb	Adjective	Adverb

Ex.8. Find the examples of word-formation with the help of the suffixes from ex.7. What words are they derived from?

Noun	Verb	Adjective	Adverb

Ex.9. Form nouns from the following verbs.

to consume –
to breed -
to produce –
to capture –
to improve –
to emerge –
to hunt -
to contaminate -

Ex. 10. Form the adjectives from the following words.

to deplete –

industry –

commerce –

necessity –

aquaculture –

domesticate –

biology –

ENVIRONMENT -

UNIT 4 FISH FARMING

Glossary:

cod - треска
common carp – карп обыкновенный
silver carp -толстолобик
coregonus – сиг
net- сеть; ловить сетью
pen – загон, ферма, запруда
salmon - лосось, сёмга
fishhatchery –рыбоводный завод, инкубатор
sturgeon- осетр, стерлядь
tow- буксировать, тащить
tilapia - тиляпия
tuna - тунец
bluefin tuna –тунец обыкновенный

Text 1. Fish farming

The farming of fish is the most common form of aquaculture. It involves raising fish commercially in tanks, ponds, or ocean enclosures, usually for food. A facility that releases juvenile fish into the wild for recreational fishing or to supplement a species' natural numbers is generally referred to as a fish hatchery. Fish species raised by fish farms include salmon, tuna, carp, tilapia, catfish and cod. Popular fish species raised in Russia are carp, the Russian sturgeon, the silver carp and coregonus.

In the Mediterranean, young bluefin tuna are netted at sea and towed slowly towards the shore. They are then interned in offshore pens where they are further grown for the market. In 2009, researchers in Australia managed for the first time to coax tuna (Southern bluefin) to breed in landlocked tanks.

SALMON

TUNA

COD

COMMON CARP

TILAPIA

Netting materials

Various materials, including nylon, polyester, polypropylene, polyethylene, plastic-coated welded wire, rubber, patented rope products, galvanized steel and copper are used for netting in aquaculture fish enclosures around the world. All of these materials are selected for a variety of reasons, including design feasibility, material strength, cost, and corrosion resistance.

Recently, copper alloys have become important netting materials in aquaculture because they are antimicrobial (i.e., they destroy bacteria, viruses, fungi, algae, and other microbes) and they therefore prevent biofouling (i.e., the undesirable accumulation, adhesion, and growth of microorganisms, plants, algae, tubeworms, barnacles, mollusks, and other organisms). By inhibiting microbial growth, copper alloy aquaculture cages avoid costly net changes that are necessary with other materials. The resistance of organism growth on copper alloy nets also provides a cleaner and healthier environment for farmed fish to grow and thrive.

Questions to Text 1

1. What is meant under "fish farming"?

2. What is a fish hatchery? How does it work?

3. What fish species are popular for fish farming in the world and in Russia?

4. There are a lot of various materials used in fish farming, aren't there?

Text 2. Issues connected with fish farming

Glossary

carnivorous – плотоядный, хищный
density - плотность, концентрация
disease- болезнь, заболевание
forage – фураж, корм
haemorrhaging- кровотечение, потеря
gillcongestion – засорение жабр
lice - вши
mucus production – выработка слизи
piscivorous – рыбоядный
predatory – хищный
sentient- чувствующий, ощущающий
skin erosion – эрозия, разъедание кожи
waste- отходы , продукты жизнедеятельности
welfare - благополучие

Aquaculture can be more environmentally damaging than exploiting wild fisheries on a local area basis but has considerably less impact on the global environment on a per kg of production basis. Local concerns include waste handling, side-effects of antibiotics, competition between farmed and wild animals, and using other fish to feed more marketable carnivorous fish. However, research and commercial feed improvements during the 1990s and 2000s have lessened many of these concerns.

Fish waste is organic and composed of nutrients necessary in all components of aquatic food webs. In-ocean aquaculture often produces much higher than normal fish waste concentrations. The waste collects on the ocean bottom, damaging or eliminating bottom-dwelling life. Waste can also decrease dissolved oxygen levels in the water column, putting further pressure on wild animals.

Impacts on wild fish

As an example, salmon farming currently leads to a high demand for wild forage fish. Fish do not actually produce omega-3 fatty acids, but instead accumulate them from either consuming microalgae that produce these fatty acids, as is the case with forage fish like herring and sardines, or, as is the case with fatty predatory fish, like salmon, by eating prey fish that have accumulated omega-3 fatty acids from microalgae. To satisfy this requirement, more than 50

percent of the world fish oil production is fed to farmed salmon.

In addition, as carnivores, salmon require large nutritional intakes of protein, protein which is often supplied to them in the form of forage fish. Consequently, farmed salmon consume more wild fish than they generate as a final product. To produce one pound of farmed salmon, products from several pounds of wild fish are fed to them. As the salmon farming industry expands, it requires more wild forage fish for feed, at a time when seventy five percent of the worlds monitored fisheries are already near to or have exceeded their maximum sustainable yield. The industrial scale extraction of wild forage fish for salmon farming then impacts the survivability of the wild predator fish who rely on them for food.

Fish can escape from coastal pens, where they can interbreed with their wild counterparts, diluting wild genetic stocks. Escaped fish can become invasive, out competing native species.

Coastal ecosystems

Aquaculture is becoming a significant threat to coastal ecosystems. About 20 percent of mangrove forests have been destroyed since 1980, partly due to shrimp farming. An extended cost–benefit analysis of the total economic value of shrimp aquaculture built on mangrove ecosystems found that the external costs were much higher than the external benefits. Over four decades, 269,000 hectares (660,000 acres) of Indonesian mangroves have been converted to shrimp farms. Most of these farms are abandoned within a decade because of the toxin build-up and nutrient loss.

Salmon farms are typically sited in pristine coastal ecosystems which they then pollute. A farm with 200,000 salmon discharges more faecal waste than a city of 60,000 people. This waste is discharged directly into the surrounding aquatic environment, untreated, often containing antibiotics and pesticides. There is also an accumulation of heavy metals on the benthos (seafloor) near the salmon farms, particularly copper and zinc.

Genetic modification

Salmon have been genetically modified for faster growth, although they are not approved for commercial use, in the face of opposition. One study, in a laboratory setting, found that modified salmon mixed with their wild relatives were aggressive in competing, but ultimately failed.

However, the controversial issue in aquaculture is whether fish and farmed marine invertebrates are actually sentient, or have the perception and awareness to experience suffering. Although no evidence of this has been found in marine invertebrates, recent stud-

ies conclude that fish do have the necessary receptors (nociceptors) to sense noxious stimuli and so are likely to experience states of pain, fear and stress. Consequently, welfare in aquaculture is directed at vertebrates; finfish in particular.

Common welfare concerns

Welfare in aquaculture can be impacted by a number of issues such as stocking densities, behavioural interactions, disease and parasitism. A major problem in determining the cause of impaired welfare is that these issues are often all interrelated and influence each other at different times.

Optimal stocking density is often defined by the carrying capacity of the stocked environment and the amount of individual space needed by the fish, which is very species specific. Although behavioural interactions such as shoaling may mean that high stocking densities are beneficial to some species, in many cultured species high stocking densities may be of concern. Crowding can constrain normal swimming behaviour, as well as increase aggressive and competitive behaviours such as cannibalism, feed competition, territoriality and dominance/subordination hierarchies. This potentially increases the risk of tissue damage due to abrasion from fish-to-fish contact or fish-to-cage contact. Fish can suffer reductions in food intake and food conversion efficiency. In addition, high stocking densities can result in water flow being insufficient, creating inadequate oxygen supply and waste product removal. Dissolved oxygen is essential for fish respiration and concentrations below critical levels can induce stress and even lead to asphyxiation. Ammonia, a nitrogen excretion product, is highly toxic to fish at accumulated levels, particularly when oxygen concentrations are low.

Many of these interactions and effects cause stress in the fish, which can be a major factor in facilitating fish disease. For many parasites, infestation depends on the host's degree of mobility, the density of the host population and vulnerability of the host's defence system. Sea lice are the primary parasitic problem for finfish in aquaculture, high numbers causing widespread skin erosion and haemorrhaging, gill congestion, and increased mucus production. There are also a number of prominent viral and bacterial pathogens that can have severe effects on internal organs and nervous systems.

Improving welfare

The key to improving welfare of marine cultured organisms is to reduce stress to a minimum, as prolonged or repeated stress can cause a range of adverse effects. Attempts to minimise stress can occur throughout the culture process. During grow out it is important to

keep stocking densities at appropriate levels specific to each species, as well as separating size classes and grading to reduce aggressive behavioural interactions. Keeping nets and cages clean can assist positive water flow to reduce the risk of water degradation.

Not surprisingly disease and parasitism can have a major effect on fish welfare and it is important for farmers not only to manage infected stock but also to apply disease prevention measures. However, prevention methods, such as vaccination, can also induce stress because of the extra handling and injection. Other methods include adding antibiotics to feed, adding chemicals into water for treatment baths and biological control, such as using cleaner wrasse to remove lice from farmed salmon.

Many steps are involved in transport, including capture, food deprivation to reduce faecal contamination of transport water, transfer to transport vehicle via nets or pumps, plus transport and transfer to the delivery location. During transport water needs to be maintained to a high quality, with regulated temperature, sufficient oxygen and minimal waste products. In some cases anaesthetics may be used in small doses to calm fish before transport.

Aquaculture is sometimes part of an environmental rehabilitation program or as an aid in conserving endangered species.

Questions to Text 2

1. How does aquaculture affect the environment?
2. What are the problems connected with salmon farming?
3. How does aquaculture threaten coastal ecosystems?
4. What is the negative side (sides) of genetic modification?
5. What are the main welfare concerns in aquaculture?
6. How can fish welfare be improved?

Grammar Review

Gerund

Герундий – одна из неличных форм глагола, которая образуется с помощью добавления суффикса **– ing** к инфинитиву.

to write – writing

to swim – swimming

Герундий может переводиться на русский язык существительным, инфинитивом, деепричастием, глаголом в личной форме и придаточным предложением.

e.g. **Recycling** materials helps to protect the environment. – Переработка материалов помогает защищать окружающую среду.

I like **doing** research. - Я люблю проводить исследования.

You can't breed this species in this pond without **carrying** out chemical analysis of the water. – Вы не можете разводить этот вид в этом водоеме, не проведя химического анализа воды.

Ex. 1. Read and translate the following sentences. Underline the gerund.

1. There is also the need for aquaculturists to raise live food, particularly for feeding the early life stages of species.

2. While the techniques for spawning and rearing some species of tune have been developed, aquaculture involves capturing young fish in purse seines, pulling the purse seine sometimes hundreds of kilometers to rearing facilities, putting the fish in the sea cages and rearing them to market size.

3. Various materials are used for netting in aquaculture fish enclosures around the world.

4. Recirculating aquaculture systems (RAS) recycle water by circulating it through filters to remove fish waste and food and then recirculating it back into the tanks.

5. The sector is now giving strong emphasis to reducing the mortalities and losses due to diseases.

6. The risk of transmitting diseases between wild and farm-raised fish would greatly be reduced.

7. As Asia contributes to over 90 percent to the global production, it is difficult to discuss global aquaculture without having a bias towards Asia.

Ex.2. Find the examples of gerund in text 2.

UNIT 5 FISH FARMING TECHNIQUES

Glossary:

hatchery - инкубаторная станция
to pertain - подходить, быть свойственным
aboost - усиление, прирост
unprecedented- беспрецедентный
cod - треска
caging system - система клетки
coastal area - побережье
artificially - искусственный
to harvest - собирать, брать для анализа.
poaching- браконьерство в торговле
to treat - лечить
to float - плавать
qrazing animal - травоядное (жвачное) животное

Ex.1.Translate this article.

Fish Farming Techniques.

Fish farming is the main form of aquaculture and it is now done on a large scale, to meet the increasing demands of fish protein. As the name suggests, it is the commercial raising of fish. One of the forms of fish farming, called hatchery pertains to the releasing of fish species into the tanks or enclosures, in order to supplement the fish species or increase the numbers of fish. Hatchery is made, so, that recreational fishing can be given a boost. The unprecedented increase in commercial fishing has resulted in overfishing and this has compelled the growth of this technique, so that, the demands of fish protein can be adequately met. Salmon, carp, tilapia, catfish and cod are some of the fish that are raised extensively in commercial fishing.

Types of fish farming.

Caging systems.

Nets or cages are popular methods of fishing in off shore coastal areas and freshwater lakes, ponds and oceans. Fish are raised in the cages, fed artificially and harvested when the numbers of fish meet the required demands of market. Some of the advantages of cage farming systems is, that this farming technique can be practiced in various types of water sources like lakes, ponds, seas and oceans, that offers flexibility to the farmers. Also, many types of fish can be raise together and the water can be used for various other purposes

like water sports. In this farming method, superior quality cages are constructed and put in the water sources to raise the fish. Spread of diseases, poaching and concerns of poor quality water are some of the disadvantages of this farming system.

Ponds.

One of the small scale techniques is raising fish in the ponds, especially designed for the purpose of raising fish. Small ponds can be made in the farms and houses that can provide its owner the ability to have control over the farming system. Ponds are useful for water harvesting in the dry areas and can also be utilized for raising fish. Waste water can be contained and treated properly to raise fish. Release of untreated waste water into the environment is possible, if the ponds are not maintained properly and can cause pollution. For small farms, ponds are effective to raise fish for self consumption.

Raceways.

If you visit any fish farming area, you may come across narrow streams flowing between two wall type structure. These streams are nothing but raceways and their purpose is to help the farmers divert water from water systems like streams or well, so that it flows through the water channels containing fish. There are various restrictions imposed on this type of farming by the government and the farmers are strictly advised to treat the water before they divert it back to the natural waterways. Also, the farmed fish can escape raceways and interfere with the wild fish habitat of the waterways.

Recirculating system.

The recirculating system uses recycled water for raising fish. The waste water is treated and recycled many times. Many fish species are grown in the recirculating systems. However, the operative cost of the electricity is a disadvantage of this method.

Fish farming tips.

It requires proper fish care. Here are some tips to focus upon:

1. Maintain the water quality in the ponds and fish tanks. The pond banks must be of adequate height, so that, no qrazing animals can enter it easily and harm the fish.

2. Check out for potential predators like snakes etc.

3. Check the fish health conditions, regularly. Fish diseases spread fast in their community. Quarantine the diseased fish and remove it from the fish tank. Cages must be constructed as per the wa-

ter body where the fish have to be put.

Floating cages are good for deep water sources. They can be kept floating by installing water bamboos in the depths of the water source. Fixed cages are better for low depth water bodies. The U.S. aquaculturists produce a whooping 1.1 billion pounds of marine plants and animals every year and by the end of 2025, fish production through aquaculture will be almost 50% of the complete aquatic food production.

[www.buzzle.com/articles/fish-farming-techniques.html]

Ex.2. Give a definition, synonym or description of each of the words or phrases below.

1. crucial
2. a problem arises
3. floating cage
4. recirculating system
5. hatchery
6. adequate height
7. marine plants
8. potential predator
9. qrazing animal
10. poaching

Ex.3. Choose the word having an opposite meaning to:

1	Fast	Rapid; quick; swift; slow.
2	Major	Large; small; main; minor.
3	Heavy	Light; intense; necessary; busy.
4	Waste	Refuse: trash: possessions; garbage
5	Flexibility	Pliancy; resiliency; ductility; resistance
6	Float	Fusion; bobber; sink; raft
7	Poor	Miserable; needy; solvent; moneyless
8	Species	Whole; sort; genus; type
9	Hatchery	Place; incubator; rookery; birthplace

10 Restriction Limitation; regulation; liberation; restraint

Ex. 4. Write the questions to the following answers.

1. Commercial raising of fish. 2. The demands of fish protein can be adequately met. 3. Disadvantages of the farming system. 4. Waste water. 5. Recycled water. 6. Fish diseases. 7. Escape raceways. 8. Adequate height. 9. Water bamboos. 10. The U.S. aquaculturist.

Ex. 5. Place the appropriate word from the list in each of the blanks below. Do not use word more than once.

artificially	initial	living	din flagellates	being farmed	
link	a food stock	bloom	item	primary	

Phytoplankton are the key food _____ in both aquaculture and mariculture. Both systems are utilizing phytoplankton as food for the animals _____. In aquaculture, phytoplankton must be obtained and developed _____ through various adapted procedures.

The plankton population in form of desirable _____ undertaken throughout the culture period as part of best pond management practice. Phytoplankton is used as_____ for the production of zooplankton which are in turn used to feed cultured organisms.

_____ are one of the most important components in phytoplankton. Many dinoflagellates are _____ producers of food in the aquatic food webs. Dinoflagellates are an integral part of the first _____in the aquatic food chain: the _____ transfer of light energy to chemical energy (photosynthesis).

/www.thefishsite.com/

Grammar review.

The Infinitive

1. Инфинитив - это неличная форма глагола, которая выражает действие, но без указания на число, лицо, наклонение.

В русском языке инфинитиву соответствует неопределенная форма глагола.
Инфинитив имеет признаки существительного и глагола.

Как и существительное, инфинитив может выполнять в предложениях те же функции, что и существительное, т.е. функцию подлежащего, дополнения, обстоятельства, именной части составного именного сказуемого:

Nellie closed her eyes and tried not to think.
Нелли закрыла глаза и пыталась не думать.

Quickly she dressed, and went into the other room to prepare their breakfast.
Она быстро оделась и вышла в другую комнату, чтобы приготовить завтрак.

Как и глагол, инфинитив имеет формы времени и залога и может определяться наречием, а в предложении инфинитив может входить в состав сказуемого (простого, составного глагольного или составного именного, являясь его смысловой частью).

Our observatory could still be used for training purposes, but the research had to move into the space.
Нашу обсерваторию (все) еще можно было использовать для тренировочных целей, но исследование нужно было выносить в открытое пространство.

He wanted to get there early, but he failed.
Он хотел рано попасть туда, но это ему не удалось.

Формальным признаком инфинитива является частица to. Однако частица to перед инфинитивом в некоторых случаях опускает-

ся.

2. Чаще всего инфинитив употребляется без частицы to в следующих случаях:
a. После модальных глаголов:

He can speak English.
Он умеет говорить по-английски.

b. Вобороте «Сложное дополнение» после глаголов to let, to make, to feel, to hear, to see, to notice, to watch:

I'll make him tell me the truth.
Я заставлю его сказать мне правду.

c. Если в предложении стоят два инфинитива, соединенные союзом and или or, частица to обычно
опускается перед вторым из них:

He promised to telephone or write.
Он обещал позвонить по телефону или написать.

Infinitive forms

Infinitive form	**Active Voice**	**Passiv Voice**
Indefinite	to ask	to be asking
Continuous	to be asking	-
Perfect	to have asked	to have been asking
Perfect Continuous	to have been asking	-

Function of the Infinitive in a sentence.

Инфинитив в предложении может употребляться в следующих функциях:
a. Подлежащего:

To see means to believe.
Увидеть - значит поверить.

b. Части сказуемого:
To know everything is to know nothing.
Знать все - значит ничего не знать.

Здесь инфинитив - именная часть сказуемого.

c. Прямого дополнения:

I asked him to give me the magazine.
Я попросил его дать мне журнал.

d. Определения:
(Часто в функции определения инфинитив переводится на русский язык определительным придаточным предложением.)

Nature has many secrets to be discovered yet.
У природы много секретов, которые еще предстоит раскрыть.

e. Обстоятельства:
His mind was too much upset to put the same thoughts in another words.
Он был слишком расстроен (вне себя), чтобы изложить те же самые мысли другими словами.

Ex.6. Define the functions of the infinitives and translate the sentences.

1. It is a very hard undertaking to seek to please everybody.
2. To construct an experiment of this kind seems nearly impossible.
3. Care should be taken not to view these three method-

ologies as competitive ones.

4. Our purpose is to attempt to give an answer to the unsolved problem outlined at the outset.

5. The operations are efficient enough to have little effect on the speed of the simulation.

6. To have got into the tradition of science in that way is to me more pleasing than to be specially mentioned.

7. It is too urgent a matter to be postponed.

8. The programs to be verified will have to be well-constructed, to make the job easier.

9. There is a danger in projecting present conditions or trends too uncritically into the future.

10. This correspondence dealt with books published or to be published.

11. With these conditions there are also opposing factors to be considered.

12. Some molecules are large enough to be seen on the electron microscope.

Ex.7. Translate the proverbs paying attention to the infinitives.

1. Fools rush in where angels fear to tread.
2. Learn to creep before you leap.
3. Learn to say before you sing.
4. Never offer to teach fish to swim.
5. Never try to prove what nobody doubts.
6. A blind man would be glad to see.
7. Never offer to teach fish to swim.
8. Nothing is impossible to a willing heart.
9. Oaks may fall when reeds stand the storm.

UNIT 6 TRENDS IN AQUACULTURE DEVELOPMENT

Glossary:

cyprinid – карповая рыба
encompass- окружать
tremendously - чрезвычайно, очень резко
relevant- уместный, актуальный
reflect - отражать
bias - смещение, уклон
intensification - повышение эффективности, усиление, углубление
unavailability - отсутствие, недоступность
restrict - ограничивать
sustain - поддерживать, подтверждать
diversification - разнообразие
facilities- бытовые удобства, льготы
reduction - понижение
offset - выступ
expansion - расширение
relatively - относительно, довольно
strain - растяжение, напряжение, деформация
per capita – на душу населения
profitability - прибыльность, рентабельность
circumstance - обстоятельство
gear - запускать
urban market- городской рынок
yield - плоды, урожай
pathogen - болезнотворный микроорганизм
mortality - смертельный, летальный

Ex. 1. Translate into Russian.

Морская экосистема, членистоногие, биологический вид, побережье, пресноводная экосистема, водоросль, инкубаторная станция, беспрецедентный, болота, рыбий протеин, водоросли, браконьерство в торговле, литоральная или прибрежная зона, литоральная или прибрежная зона, потенциальный хищник, питательное вещество, усиление, прирост, мелкий, мелководный, треска, соленость, расположенный между приливом и отливом,

подходить, быть свойственным, насыщать, пропитывать, травоядное (жвачное) животное.

Ex. 2. Read and translate the text.

Trends in aquaculture development

From an activity that was primarily Asian, aquaculture has now spread to all the continents. From an activity that was focused on freshwater fish, particularly the cyprinids, it now encompasses all the aquatic environments and many aquatic species. Clearly, its Asian origin and its carp-focused beginnings are still evident in the present distribution and the dominance of cyprinids.

World aquaculture has grown tremendously during the last 50 years from a production of less than a million tonnes in the early 1950s to 59.4 million tonnes by 2004. This level of production had a value of US$ 70.3 billion. Of the production, 41.3 million tonnes or 69.6 percent were produced in the Peoples' Republic of China (hence after referred to as China) and 21.9 percent from the rest of the Asia-Pacific region. The Western European region contributed 3.5 percent with 2.1 million tones (valued at US$ 5.4 billion), while the Central and Eastern Europe region contributed 250 000 tonnes, or 0.4 percent. Latin America and the Caribbean and North America contributed 2.3 percent and 1.3 percent respectively. Finally, production from the Near East and North Africa region and Sub-Saharan Africa accounted for 0.9 percent and 0.2 percent, respectively, of the global total for 2004.

General trends in global aquaculture

It must be stated clearly that it is extremely difficult to generalise trends in aquaculture development. The trends provided below are much relevant and reflect the behavior of the sector in the countries where aquaculture is well established. As Asia contributes to over 90 percent to the global production, it is difficult to discuss global aquaculture without having a bias towards Asia.

Continuing intensification of aquaculture production

Various factors are driving the aquaculture sector to intensify.

The main driving force appears to be the unavailability of sites. As availability of sites for aquaculture is becoming increasingly limited and the ability to exploit non-agricultural land is restricted, along with economic drivers, the aquaculture production systems are being increasingly intensified. Intensification may sustain profitability of farming operations, but this comes at a cost. Not all farmers are able to intensify and as production costs rise part of the sector may reduce intensity to lower costs or reduce vulnerability to health or environmental problems. Under appropriate circumstances there are opportunities for organic aquaculture to play a role and this may become an economically viable form of management.

Continuing diversification of species use

Aquaculture continues to explore new species options, particularly high value species, in regions and countries where aquaculture is well established. While facilities for mariculture of high value species have increased, reduction in facilities for producing low value high volume species such as cyprinids is evident in those countries (particularly China). However, in the future, reduction in freshwater aquaculture areas may partly be offset by expansion in marine areas particularly for the culture of relatively higher value species. Regions and countries where aquaculture is still in early stages; particularly Africa and some South Asian countries, freshwater species production is still continuing. In some South Asian countries better opportunities for giant freshwater prawn *Macrobrachiumrosenbergii* are visible. Countries are continuing to introduce species or strains for aquaculture, while efforts are made to develop specific strains aquaculture, particularly the high value species. Although countries are increasingly looking into complying with international norms and standards for movements of live aquatic organisms and introductions, commercially driven movements and introductions that are not responsible are also evident in many regions of the world.

Increasing influence of markets, trade and consumers

There is a trend of increasing fish consumption in many countries (although apparent consumption data shows a decrease in per caput consumption in many countries in Sub-Saharan Africa) and this domestic and regional demand competes with export markets, particularly in Asia. Producers and processors are slowly moving toward greater value adding and development of processed products for

export markets as an avenue for increasing foreign exchange earnings and improving profitability. In such circumstances, the choice of species for farmers is becoming geared to the demand for products in the international markets. Moreover, there is a trend towards targeting urban markets with standardized, value added "easy-to-cook" or 'supermarket-type' products.

Drive towards better management of the aquaculture sector

In many countries, instead of high yield per unit area, aquaculture is now aiming more on economic sustainability and overall competitiveness. One of the key areas considered is the improved management of health. As pathogens and diseases are causing significant losses in global aquaculture, the sector is now giving strong emphasis to reducing the mortalities and losses due to diseases. This trend does not only focus on production and practice, but also the issue of acquiring quality inputs like clean seed and quality feed, and sound advice to reduce risks of production failures.

The combined effect of all these trends is to drive the sector towards improved or better management. This is seen at the individual farm level as well as specific sub-sectoral levels. It has not occurred simultaneously throughout the aquaculture sector worldwide; although in the future it will materialize as different pressures are applied (these could be regulatory, market, environmental or social, etc.).

[http://www.fao.org/fishery/topic/13831/en]

Ex. 3. Answer the questions.

1. In what way has world aquaculture grown? Give some examples.
2. What are the main trends in global aquaculture?
3. What are various factors driving the aquaculture sector to intensify?
4. Not all farmers are able to intensify and as production costs rise part of the sector may reduce intensity to lower costs or reduce vulnerability to health or environmental problems. Give your reasons.
5. Explain every trend in global aquaculture.

Ex. 4. Which word is odd? Why?

obliterate	destroy	drift
at first glance	at first sight	in the first place
deficit	shortage	excess
disease	illness	health
damage	advantage	harm
due to	because of	in spite of
hazard	damage	benefit
reduce	decrease	become bigger
nutrients	food	poison
variety	range of different things	similarity
eliminate	get rid of	absorb
allow	ban	permit
reflect	bounce off	defect
trend	tendency	measure
aim	favour	object

Ex.5. Choose one word from the box for each group of the words and translate. Use the words only once.

animal	mortality	yield	floating	circumstance
harvest	aqua	fish		

1. ____ a fair return	2. _____ in proof	3. _____ date	4. _____ a company
_____ a profit	_____ pass	_____ curve	_____a loan
_____ a flavor	_____ jammer	_____ analysis	_____ account

5. _____ acid 6. _____ a coin from pocket 7. _____ area 8. grazing _____
_____ ammonia _____ a lake _____ campaign _____ abuse
_____ and inject _____a stream _____ combine _____ activity

Ex. 6. Read the text and answer the questions.

Prospects

Global wild fisheries are in decline, with valuable habitat such as estuaries in critical condition. The aquaculture or farming of piscivorous fish, like salmon, does not help the problem because they need to eat products from other fish, such as fish meal and fish oil. Studies have shown that salmon farming has major negative impacts on wild salmon, as well as the forage fish that need to be caught to feed them. Fish that are higher on the food chain are less efficient sources of food energy.

Apart from fish and shrimp, some aquaculture undertakings, such as seaweed and filter-feeding bivalve mollusks like oysters, clams, mussels and scallops, are relatively benign and even environmentally restorative. Filter-feeders filter pollutants as well as nutrients from the water, improving water quality. Seaweeds extract nutrients such as inorganic nitrogen and phosphorus directly from the water, and filter-feeding mollusks can extract nutrients as they feed on particulates, such as phytoplankton and detritus.

Some profitable aquaculture cooperatives promote sustainable practices. New methods lessen the risk of biological and chemical pollution through minimizing fish stress, fallowing netpens, and applying Integrated Pest Management. Vaccines are being used more and more to reduce antibiotic use for disease control.

Onshore recirculating aquaculture systems, facilities using polyculture techniques, and properly sited facilities (for example, offshore areas with strong currents) are examples of ways to manage negative environmental effects.

Recirculating aquaculture systems (RAS) recycle water by circulating it through filters to remove fish waste and food and then recirculating it back into the tanks. This saves water and the waste gathered can be used in compost or, in some cases, could even be treated and used on land. While RAS was developed with freshwater fish in mind, scientist associated with the Agricultural Research Service have found a way to rear saltwater fish using RAS in low-salinity waters. Although saltwater fish are raised in off-shore cages or caught with nets in water that typically has a salinity of 35 parts per thousand (ppt), scientists were able to produce healthy pompano, a saltwater

fish, in tanks with a salinity of only 5 ppt. Commercializing low-salinity RAS are predicted to have positive environmental and economical effects. Unwanted nutrients from the fish food would not be added to the ocean and the risk of transmitting diseases between wild and farm-raised fish would greatly be reduced. The price of expensive saltwater fish would be reduced. However, before any of this can be done researchers must study every aspect of the fish's lifecycle, including the amount of ammonia and nitrate the fish will tolerate in the water, what to feed the fish during each stage of its lifecycle, the stocking rate that will produce the healthiest fish, etc.

Some 16 countries now use geothermal energy for aquaculture, including China, Israel, and the United States. In California, for example, 15 fish farms produce tilapia, bass, and catfish with warm water from underground. This warmer water enables fish to grow all year round and mature more quickly. Collectively these California farms produce 4.5 million kilograms of fish each year.

[1. www.wikipedia.org

2. Aquaculture: an introductory text /Robert R. Stickney. – 2-nd ed., UK 2009]

Questions:

1. What is the state of global wild fisheries nowadays?
2. What do aquaculturalists do to lessen the present day situation?
3. How is geothermal energy used in aquaculture?

ЛИТЕРАТУРА

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