МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСІТЕТ МІСЬКОГО
ГОСПОДАРСТВА імені О. М. БЕКЕТОВА

МЕТОДИЧНІ ВКАЗІВКИ
ДЛЯ ОРГАНІЗАЦІЇ ПРАКТИЧНОЇ РОБОТИ
З ДИСЦИПЛІНИ «ІНОЗЕМНА МОВА»
(АНГЛІЙСЬКА МОВА)

(для студентів 1 курсу заочної форми навчання
напряму підготовки 6.060103 «Гідротехника (водні ресурси)»)

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Методичні вказівки для організації практичної роботи з дисципліни «Іноземна мова» (англійська мова) (для студентів 1 курсу заочної форми навчання напряму підготовки «Гідротехника (водні ресурси)»)/ Харк. нац.. ун-т міськ. госп-ва ім. О. М. Бекетова; уклад.: В. Б. Пряницька. – Х.: ХНУМГ, 2014. – 50 с.

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Методичні вказівки для організації практичної роботи студентів згідно з затвердженою робочою програмою навчальної дисципліни «Іноземна мова», укладеної відповідно освіто-кваліфікаційним вимогам до знань і вмінь студентів напрямів підготовки «Гідротехника (водні ресурси)», які у майбутньому будуть працювати у сфері гідротехники та водних ресурсів..

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INTRODUCTION

These educational materials are designed for the ESP students of tourism of the 1st year of studies to develop their knowledge and skills in the English language.

This manual is based on the authentic texts from different sources concerning cross-cultural issues. It contains the tasks for reading and translation, vocabulary tasks and grammar exercises.
Each unit contains:

- An authentic text for reading and translation;
- Comprehension exercises;
- Exercises for memorization and mastering new vocabulary;
- Grammar exercises;
- Supplementary reading

The manual is recommended for practical lessons

UNIT 1. Role of foreign languages in our life.

Task 1. Read and translate the text.

1.1 Why should I learn a language?

0	D

Learning a foreign language takes time and dedication. The reasons below may help to convince you to take the plunge, if such persuasion is needed. Some reasons are practical, some aspirational, some intellectual and others sentimental, but whatever your reasons, having a clear idea of why you're learning a language can help to motivate you in your studies.

If you talk to a man in a language he understands, that goes to his head. If you talk to him in his language, that goes to his heart. (Nelson Mandela)

When you move to a different country or region, learning the local language will help you to communicate and integrate with the local community. Even if many of the locals speak your language, for example if your L1 is English and you move to the Netherlands, it's still worth learning the local language. Doing so will demonstrate your interest in and commitment to the new country.

1

If your partner, in-laws, relatives or friends speak a different language, learning that language will help you to communicate with them. It can also give you a better understanding of their culture and way of thinking. If you and some of your relatives, friends or colleagues speak a language that few people understand, you can talk freely in public without fear of anyone eavesdropping, and/or you can keep any written material secret. Speakers of such Native American languages as Navajo, Choctaw and Cheyenne served as radio operators, known as Code Talkers, to keep communications secret during both World Wars. Welsh speakers played a similar role during the Bosnian War.

2

If your work involves regular contact with speakers of foreign languages, being able to talk to them in their own languages will help you to communicate with them. It may also help you to make sales and to negotiate and secure contracts. Knowledge of foreign languages may also increase your chances of finding a new job, getting a promotion or a transfer overseas, or of going on foreign business trips.

Many English-speaking business people don't bother to learn other languages because they believe that most of the people they do business with in foreign countries can speak English, and if they don't speak English, interpreters can be used. The lack of foreign language knowledge puts the English speakers at a disadvantage. In meetings, for example, the people on the other side can discuss things amongst themselves in their own language without the English speakers understanding, and using interpreters slows everything down. In any socialising after the meetings, the locals will probably feel more comfortable using their own language rather than English.

3

You may find that information about subjects you're interested in is published mainly in a foreign language. Learning that language will give you access to the material and enable you to communicate with fellow students and researchers in the field.

Language is the archives of history.
(Ralph Waldo Emerson)

4

Many English speakers seem to believe that wherever you go on holiday you can get by speaking English, so there's no point in learning any other languages. If people don't understand you all you have to do is speak slowly and turn up the volume. You can more or less get away with this, as long as you stick to popular tourist resorts and hotels where you can usually find someone who speaks English. However, if you want to venture beyond such places, to get to know the locals, to read signs, menus, etc, knowing the local language is necessary.

Americans who travel abroad for the first time are often shocked to discover that, despite all the progress that has been made in the last 30 years, many foreign people still speak in foreign languages. (Dave Barry)

A basic ability in a foreign language will help you to 'get by', i.e. to order food and drink, find your way around, buy tickets, etc. If you have a more advanced knowledge of the language, you can have real conversations with the people you meet, which can be very interesting and will add a new dimension to your holiday.

The limits of my language are the limits of my universe.(Ludwig Wittgenstein)

If you plan to study at a foreign university, college or school, you'll need a good knowledge of the local language, unless the course you want to study is taught through the medium of your L1. Your institution will probably provide preparatory courses to improve your language skills and continuing support throughout your main course.

5

If your family spoke a particular language in the past you might want to learn it and possibly teach it to your children. It could also be useful if you research your family tree and some of the documents you find are written in a language foreign to you.

If you speak an endangered language, or your parents or grandparents do/did, learning that language and passing it on to your children could help to revitalise or revive it.

6

Maybe you're interested in the literature, poetry, films, TV programs, music or some other aspect of the culture of people who speak a particular language and want to learn their language in order to gain a better understanding of their culture.

Most people in the world are multilingual, and everybody could be; no one is rigorously excluded from another's language community except through lack of time and effort. Different languages protect and nourish the growth of different cultures, where different pathways of human knowledge can be discovered. They certainly make life richer for those who know more than one of them. (Nicholas Ostler, *Empires of the Word*)

Missionaries and other religious types learn languages in order to spread their message. In fact, missionairies have played a major role in documenting languages and devising writing systems for many of them. Others learn the language(s) in which the scriptures/holy books of their religion were originally written to gain a better understanding of them. For example, Christians might learn Hebrew, Aramaic and Biblical Greek; Muslims might learn Classical Arabic, and Buddhists might learn Sanskrit.

Among other important reasons for learning languages there are some important ones such as linguistic interest, challenge of learning a particularly difficult language, better understanding our thought processes, our own language and culture , wish to find future husband/wife, learning songs in other languages, talking to friends without others understanding you and so on.

Task 2. Answer the questions

1. Why should we learn foreign languages?
2. Do business people need to learn foreign languages?
3. Why does speaking foreign languages help understand better our own language and culture?

4. Is it important to learn more than one foreign language?

Task 3. Choose the most suitable heading from the list A-G for each part (1-6) of the text. There is one extra heading which you do not need to use. There is an example at the beginning (0).

A Culture and religion
B Travelling or studying abroad
C Family and friends
D Emigration
E Education abroad
F Getting in touch with your roots
G Study or research
H Work

Task 4**.** Match the left column with the right one according to the text.

communicate and integrate	speakers of foreign languages
talk freely	understanding
regular contact with	learning any other languages
The lack of foreign	in public
the English speakers	language knowledge
there's no point in	with the local community
to study at a foreign	their message
in order to spread	university, college or school

Task 5 Put the verb into the correct form (Present Simple, Present Continuous)

1. Learning a foreign language ……...(take) time and dedication.
2. . Even if many of the locals ……(speak) your language it's still worth learning the local language.
3. Why ….. you (speak) English now? There is no need to do it. Everybody …….. (understand) your native language.

4. Maybe you …. (be) interested in the literature, poetry, films, TV programs, music or some other aspect of the culture of people who speak a particular language.
5. Don't disturb me! I …….. (learn) Spanish at the moment.
6. Among other important reasons for learning languages there … (be) some important ones such as linguistic interest, challenge of learning a particularly difficult language, better understanding our thought processes and so on.

Task 6. Among three options choose the synonym for the underlined word.

1. The reasons below may help <u>to convince</u> you to take the plunge, if such persuasion is needed.

a) force b) persuade c) make

2.When you <u>move</u> to a different country or region, learning the local language will help you to communicate and integrate with the local community.

a) emigrate b) settle c) inhabit

3. The lack of foreign language knowledge puts the English speakers at a disadvantage.

4. Your institution will probably <u>provide</u> preparatory courses to improve your language skills.

a) make b) give c) enforce

5. If your family spoke a particular language <u>in the past</u> you might want to learn it and possibly teach it to your children.

a) since ancient times b) so long c) some years ago

6. They <u>certainly</u> make life richer for those who know more than one of them.

a) surely b) perfectly c)with a doubt

UNIT 2 . Higher Education

2.1 Higher education in Ukraine

Task1. Read and translate the text.

Higher education in Ukraine has a long and rich history. Its students, graduates and

academics have long been known and appreciated worldwide. The pioneering research of scholars working in the country's higher education institutions and academies, such as Dmytro Mendeleyev, Mykola Zhukovsky, and Yeugeny Paton, are part of the universal history of scientific progress.

Brief historical survey

The first higher education institutions (HEIs) emerged in Ukraine during the late 16th and early 17th centuries. The first Ukrainian higher education institution was the Ostrozka School, or Ostrozkiy Greek-Slavic-Latin Collegium, similar to Western European higher education institutions of the time. Established in 1576 in the town of Ostrog, the Collegium was the first higher education institution in the Eastern Slavic territories. The oldest university was the Kyiv Mohyla Academy, first established in 1632 and in 1694 officially recognized by the government of Imperial Russia as a higher education institution. Among the oldest is also the Lviv University, founded in 1661. More higher education institutions were set up in the 19th century, beginning with universities in Kharkiv (1805), Kiev (1834), Odessa (1865), and Chernivtsi (1875) and a number of professional higher education institutions, e.g.: Nizhyn Historical and Philological Institute (originally established as the Gymnasium of Higher Sciences in 1805), a Veterinary Institute (1873) and a Technological Institute (1885) in Kharkiv, a Polytechnic Institute in Kiev (1898) and a Higher Mining School (1899) in Katerynoslav. Rapid growth followed in the Soviet period. By 1988 a number of higher education institutions increased to 146 with over 850,000 students. Most HEIs established after 1990 are those owned by private organizations.

The *Constitution of Ukraine (1996)*, *Law on Education (1996)*, and the *Law on Higher Education (2002)* constitute the legal framework for Ukrainian higher education. The Ukrainian legislation regulating higher education includes also more limited legislation as well as decrees and regulations of the President and the Cabinet of Ministers of Ukraine.

Higher education qualifications

Higher education qualifications combine both academic and professional qualifications. This is a very important feature of Ukrainian higher education inherited from its Soviet past. The State Diploma serves as both an educational certificate and a professional licence. Employment is determined by a match between the state determination of the knowledge and skills required for different occupation levels and the state determination of levels of educational qualification. Hence is the correspondence between classification of educational qualification and that of the occupational structure, leading to the introduction of the term 'educational-proficiency' level.

The *Law on Higher Education* (2002) establishes the three-level structure of higher education: incomplete, basic, and complete educational levels with corresponding

educational-proficiency levels of Junior Specialist, Bachelor, Specialist and Master.

Junior Specialist

Junior Specialist is an educational-proficiency level of higher education of a person who on the basis of complete secondary education has attained incomplete higher education, special skills and knowledge sufficient for discharging productive functions at a certain level of professional activity, stipulated for initial positions in a certain type of economic activity. The normative period of training makes 2.5–3 years.

Persons with basic secondary education may study in the educational and professional programs of junior specialist's training, obtaining at the same time complete secondary education.

Bachelor

Bachelor is an educational-proficiency level of higher education of a person who on the basis of complete secondary education has attained basic higher education, fundamental and special skills and knowledge, sufficient to cope with tasks and duties (work) at a certain level of professional activity (in economy, science, engineering, culture, arts, etc.). The normative period of training makes 4 years (240 ECTS credits).

Training specialists of the educational-proficiency level of Bachelor may be carried out according to the shortened program of studies on the basis of the educational-proficiency level of Junior Specialist.

Specialist

Specialist is an educational-proficiency level of higher education of a person who on the basis of the educational-proficiency level of Bachelor has attained complete higher education, special skills and knowledge, sufficient to cope with tasks and duties (work) at a certain level of professional activity (in economy, science, engineering, culture, arts, etc.). The normative period of training makes 1 year (60 ECTS credits).

Master

Master is an educational-proficiency level of higher education of a person who has attained complete higher education, special skills and knowledge, sufficient to cope with professional tasks and duties (work) of innovative character at a certain level of professional activity (in engineering, busyness administration, pedagogics, arts, etc.).

Training specialists of the educational-proficiency level of Master may also be carried out on the basis of the educational-proficiency level of Specialist. The period of training makes typically 1–1.5 year (60-90 ECTS credits).

During his/her studies at the Master's or Specialist's level, students are required to write his/her final work on a selected subject and make its presentation, to be able to collect, analyse and summarize, synthesize and to communicate study and practical material; often knowledge of a foreign language is required.

Training specialists of the educational-proficiency level of Specialist or Master in such fields as medicine, dentistry, veterinary medicine, teaching is carried out on the basis of complete secondary education within the period of 5–6 years (301-360 ECTS credits) (as is common in Western Europe for state registered professions).

Diplomas and Certificates

Higher education graduates are awarded qualifications of the appropriate educational-proficiency levels and they are granted diplomas of the state format. The Diploma is the State-recognized document which serves as both an educational certificate and a professional licence, confirming the attainment of the appropriate higher educational level and qualification of a certain educational-proficiency level (an academic degree in a field of study and speciality). The *Law on Higher Education* (2002) establishes the following types of documents that confirm higher education qualifications:

- *Dyplom Molodshoho Spetsialista* (Diploma/ qualification of Junior Specialist)
- *Dyplom Bakalavra* (Diploma/ qualification of Bachelor)
- *Dyplom Spetsialista* (Diploma/ qualification of Specialist)
- *Dyplom Mahistra* (Diploma/ qualification of Master)

Types of Universities (Academies)

The Ministry of Education and Science (Sports and Youth) recognizes the following categories of institutions of the top-level accreditation:

- Classical Universities
- Technical Universities
- Technological (Construction, Transportation)
- Pedagogical (Humanitarian, Physical Education and Sports)
- Culture (Arts, Design)
- Health Care Universities
- Agrarian Universities
- Economics (Finance, Administration, Entrepreneurship)
- Law (Law enforcement, Civil protection and life safety)
- Private Universities

Postgraduate education

In Ukraine Postgraduate education is regarded as specialist education and professional training commencing after the Specialist, Master phase. The *Law of Higher Education (Article 10)* and the *Law on Education (Article 47)* regard Post-Graduate education as specialised education and professional training on the basis of the previously obtained educational-proficiency level and experience of the practical work. It is defined as retraining, specialisation within a profession; expansion of the professional profile; probation within a profession, i.e. post-qualifying education or continuous professional development. The system of Postgraduate training serves as a ground for lifelong learning.

Task 2. Answer the questions

1. What can you tell about history of higher education development in Ukraine?
2. When did the first university emerge in Ukraine?
3. What are educational-proficiency levels of education?
4. What types of universities do you know?
5. How is Postgraduate education regarded?

Task 3. What do these numbers refer to?
17, 1576, 1632, 1805, 1834, 1865, 1875, 1996, 2002, 2.5-3, 4, 1.

Task 4. Match the left column with the right one according to the text.

The first higher education institutions (HEIs)	both academic and professional qualifications.
The oldest university was	also the Lviv University, founded in 1661.
Among the oldest is	at a certain level of professional activity
Higher education qualifications combine	emerged in Ukraine during the late 16th and early 17th centuries.
Higher education graduates	the Kyiv Mohyla Academy, first established in 1632.

to cope with tasks and duties (work)	are awarded qualifications of the appropriate educational-proficiency level.

Task 5. Among three options choose the most suitable synonym for the underlined word.

The first higher education institutions (HEIs) emerged in Ukraine during the late 16th and early 17th centuries.

a) Appeared b) developed c) run

More higher education institutions were set up in the 19th century, beginning with universities in Kharkiv (1805), Kiev (1834), Odessa (1865), and Chernivtsi (1875).

a) Inhabited b)established c)built

Persons with basic secondary education may study in the educational and professional programs of junior specialist's training, obtaining at the same time complete secondary education.

a) Sufficient b)full c)absolute

In Ukraine Postgraduate education is regarded as specialist education and professional training commencing after the Specialist, Master phase.

a) considered b) allowed c)put

Task 6. Put the verb in brackets into the correct form (Present Simple, Past Simple)

1. The first Ukrainian higher education institution ….. (be) the Ostrozka School, or Ostrozkiy Greek-Slavic-Latin Collegium, similar to Western European higher education institutions of the time.
2. By 1988 a number of higher education institutions ……(increase) to 146 with over 850,000 students.
3. The *Law on Higher Education* (2002) …… (establish) the three-level structure of higher education.
4. Higher education qualifications …….(combine) both academic and professional qualifications.
5. The normative period of training …….. (make) 4 years (240 ECTS credits).
6. The Ministry of Education and Science (Sports and Youth) …… (recognize) the following categories of institutions of the top-level accreditation.

2.2 Education in England

Task 1. Read and translate the text.

The chapel of King's College, Cambridge University.

0	**D**

Education in England is overseen by the Department for Education and the Department for Business, Innovation and Skills. Local authorities (LAs) take responsibility for implementing policy for public education and state schools at a local level.

The education system is divided into early years (ages 3–4), primary education (ages 4–11), secondary education (ages 11–18) and tertiary education (ages 18+).

Full-time education is compulsory for all children aged between 5 and 17 (from 2013, and up to 18 from 2015), either at school or otherwise, with a child beginning primary education during the school year he or she turns 5. Students may then continue their secondary studies for a further two years (sixth form), leading most typically to A-level qualifications, although other qualifications and courses exist, including Business and Technology Education Council (BTEC) qualifications, the International Baccalaureate (IB) and the Cambridge Pre-U. The leaving age for compulsory education was raised to 18 by the Education and Skills Act 2008. The change takes effect in 2013 for 16-year-olds and 2015 for 17-year-olds. State-provided schooling and sixth form education is paid for by taxes. England also has a tradition of independent schooling, but parents may choose to educate their children by any suitable means.

Higher education often begins with a three-year bachelor's degree. Postgraduate degrees include master's degrees, either taught or by research, and the doctorate, a research degree that usually takes at least three years. Universities require a Royal Charter in order to issue degrees, and all but one are financed by the state via tuition

fees, which cost up to £9,000 per academic year for English, Welsh and EU students.

1

Until 1870 all schools were charitable or private institutions, but in that year the Elementary Education Act 1870 permitted local governments to complement the existing elementary schools, to fill up any gaps. The Education Act 1902 allowed local authorities to create secondary schools. The Education Act 1918 abolished fees for elementary schools.

2

The school year begins on 1 September (or 1 August if a term starts in August). Education is compulsory for all children from the next "prescribed day" which falls either on or after their fifth birthday to the last Friday in June of the school year in which they turn 16. This will be raised, in 2013, to the year in which they turn 17 and, in 2015, to their 18th birthday. The prescribed days are 31 August, 31 December and 31 March.

3

State-run schools and colleges are financed through national taxation, and take pupils free of charge between the ages of 3 and 18. The schools may levy charges for activities such as swimming, theatre visits and field trips, provided the charges are voluntary, thus ensuring that those who cannot afford to pay are allowed to participate in such events. Approximately 93% of English schoolchildren attend such schools.

A significant minority of state-funded schools are faith schools, which are attached to religious groups, most often the Church of England or the Roman Catholic Church.

There is also a small number of state-funded boarding schools, which typically charge for board but not tuition. Boarding fees are limited to £12,000 per annum.

4

Red Brick university'.

Students normally enter university from age 18 onwards, and study for an academic degree. Historically, all undergraduate education outside the private University of Buckingham and BPP University College was largely state-financed, with a small contribution from top-up fees, however fees of up to £9,000 per annum have been charged from October 2012. There is a distinct hierarchy among universities, with the Russell Group containing most of the country's more prestigious, research-led and research-focused universities. The state does not control university syllabuses, but it does influence admission procedures through the Office for Fair Access (OfFA), which approves and monitors access agreements to safeguard and promote fair access to higher education. Unlike most degrees, the state still has control over teacher training courses, and uses its Ofsted inspectors to maintain standards.

The typical first degree offered at English universities is the bachelor's degree, and usually lasts for three years. Many institutions now offer an undergraduate master's degree as a first degree, which typically lasts for four years. During a first degree students are known as undergraduates. The difference in fees between undergraduate and traditional postgraduate master's degrees (and the possibility of securing LEA funding for the former) makes taking an undergraduate master's degree as a first degree a more attractive option, although the novelty of undergraduate master's degrees means that the relative educational merit of the two is currently unclear.

Some universities offer a vocationally based foundation degree, typically two years in length for those students who hope to continue on to a first degree but wish to remain in employment.

5

Students who have completed a first degree are eligible to undertake a postgraduate degree, which might be a:

- Master's degree (typically taken in one year, though research-based master's degrees may last for two)
- Doctorate (typically taken in three years)

Postgraduate education is not automatically financed by the state, and so admissions are highly competitive.

Task 2. Questions

1) What is education in England overseen by?
2) How is the education system divided into?
3) Is education compulsory for children aged between 5 and 17?

Task 3. Choose the most suitable heading from the list A-G for each part (1-6) of the text. There is one extra heading which you do not need to use. There is an example at the beginning (0).

A Postgraduate education

B Primary and secondary education

C History of English education

D Introduction

E Principles of education in England

F State-funded school system

G Higher education

Education in the USA

Task 1. Read and translate the text.

The USA does not have a national system of education. All educational matters are left to states. 50 per cent of funds for education come from state sources, about 40 from local funds, and only 6 per cent from the federal government. There are two major types of schools in the USA— public which are free, and private, or fee-paying. Four of five private schools are run by churches and other religious groups.

Elementary education starts at the age of 6 and continues till 10-11 years. Secondary education is provided from the age 11 — 12. Intermediate school includes grades 6 through 9 for ages 11-12 up to 14—15. A senior high school may include grades 9—10 through 12. A senior high school may be comprehensive, general or vocational. A comprehensive school offers a broad program of academic and vocational education, a general school offers a more limited program. A vocational school focuses on vocational training with some general educational subjects. All such programs — academic, technical, or practical are generally taught under one roof. Nevertheless, many students of high school don't finish it. 1 per cent of American citizens at the age of 14 can neither read, nor write. High school students who wish to attend a college or a university go through one of the two standard tests — SAT (Scholastic Aptitude Test) and ACT (American College Test). They are given by non-profit, non-governmental organizations.

There are several ways to continue in education: universities, colleges, community colleges, and technical and vocational schools. A university in the USA usually consists of several colleges; each college specializes in a subject area. There are colleges of liberal arts, colleges of education and business colleges. A program for undergraduates usually takes four years and leads to the Bachelor of Arts or Science degree. After that, students may leave the university or go on for a graduate or professional degree. The university may be funded from several different sources. A publicly funded university gets some money form the state government. A privately funded university gets money from private sources only. A university may be funded by a religious group.

College students usually spend four years at the college, too, and get the Bachelor's degree. In contrast to universities, colleges don't have graduate or professional programs. Colleges in the USA differ greatly in size — they may include from 100 students to 5000 and more. Most of the larger institutions fall into the category of universities, the largest being the University of California, State university of New York, New York university, Columbia University and others.

The course of study in a community college lasts two years and doesn't lead to any degree. Community colleges may give courses in the regular academic subjects or subject like dental technology, sewing and other non-academic subjects. Not all students of community colleges have high school diplomas. Technical, or vocational schools have no academic programs and provide only job training. Programs may take from six months to two years and more.

Task 2. Answer the questions

1) What are characteristics of education in the USA?
2) What are two major types of schools in the USA?
3) Ta what age does elementary (secondary, intermediate, senior high school) education starts?
4) What does a comprehensive school offer?
5) What does a vocational school focus on?
6) What are the ways to continue in education?

Task 3. Translate the following sentences into English.

1. В США, где все вопросы образования находятся в ведении штатов, образование финансируется штатами, из местных фондов и религиозными группами, и только около 6 процентов финансирования исходит от федерального правительства.

2. В США общественные школы бесплатные, а частные школы платные.

3. Школьное образование состоит из начального образования, промежуточного

образования и старших классов средней школы.

4. В старших классах средней общеобразовательной школы предлагается обширная программа академических и профессиональных предметов, преподаваемых в одном здании.

5. Программа общей школы более ограничена, чем программа общеобразовательной школы.

6. Программа профессиональной школы предлагает профессиональную подготовку и некоторые академические предметы.

7. Выпускники средней школы должны сдать один из двух стандартных тестов, SAT или ACT, которые проводятся некоммерческими, неправительственными организациями.

8. Выпускники средней школы, которые хотят продолжить образование в вузе, могут попытаться поступить в университет, колледж или техническую или профессиональную школу.

9. Программа для студентов колледжа или университета заканчивается присвоением звания бакалавра гуманитарных или точных и естественных наук.

10. Выпускники колледжа должны идти в университет, чтобы получить ученую степень выше бакалавра или профессиональную степень.

Task 1. Read and translate the text.

2.3 Higher Education in the USA

Many students, upon finishing high school, choose to continue their education. The system of higher education includes 4 categories of institutions.

The community college, which is financed by the local community in different professions. Tuition fees are low in these colleges, that's why about 40 per cent of all American students of higher education study at these colleges. On graduation from such colleges American students get "associate degree" and can start to work or may transfer to 4-year colleges or universities (usually to the 3rd year).

The technical training institution, at which high school graduates may take courses ranging from six months to three-four years, and learn different technical skills, which may include design business, computer programming, accounting, etc. The best-known of them are: the Massachusetts Institute of Technology and the Technological Institute in California.

The four-year college, which is not a part of a university. The graduates receive the degree of Bachelor of Arts (BA) or Bachelor of Science (BS). There are also small Art Colleges, which grant degrees in specialized fields such as ballet, film-making and even circus performance. There are also Pedagogical Colleges.

The university, which may contain:

several colleges for students who want to receive a bachelor's degree after four years of study;

one or more graduate schools for those who want to continue their studies after college for about two years to receive a master's degree and then a doctor's degree. There are 156 universities in the USA.

Any of these institutions of higher education may be either public or private. The public institutions are financed by state. Most of the students, about 80 per cent, study at public institutions of higher education, because tuition fees here are much lower. Some of the best-known private universities are Harvard. Yale and Princeton.

It is not easy to enter a college at a leading university in the United States. Successful applicants at colleges of higher education are usually chosen on the basis of:

their high-school records which include their class rank, the list of all the courses taken and all the grades received in high school, test results;

recommendation from their high-school teachers;

the impression they make during interviews at the university, which is in fact a serious examination;

scores on the Scholastic Aptitude Tests.

The academic year is usually nine months, divided into two terms. Studies usually begin in September and end in July. Each college or university has its own curriculum. During one term a student must study 4 or 5 different courses. There are courses that every student has to take in order to receive a degree. These courses or subjects are called major subjects or "majors".

At the same time there are subjects which the student may choose himself for his future life. These courses are called 'electives". A student has to earn a certain number of "credits" (about 120) in order to receive a degree at the end of four years of college. Credits are earned by attending lectures or laboratory classes and completing assignments and examinations.

Students who study at a university or four-year college are known as undergraduates.

Those who have received a degree after 4 years of studies are known as graduates. They may take graduate program for another 2 years in order to get a master's degree. Further studies are postgraduate which result in a doctor's degree.

Task 2. Answer the questions

1) What categories does the system of higher education include?
2) What is the community college financed by?
3) What does studing in the technical training institution include?
4) What may the university contain?
5) Are institutions of higher education public or private?
6) What courses are called 'electives"?

Task 3 . Match the left column with the right one

The system of higher education	small Art Colleges.
The institutions of higher education	includes 4 categories of institutions.
Tuition fees are low	may be either public or private.
Students who study at a university or	after 4 years of studies are known as graduates.
Those who have received a degree in	community colleges
There are also	four-year college are known as undergraduates.

Task 4. Put the verbs into Active or Passive voice

1) Many students, upon finishing high school, ……..(choose) to continue their education.
2) The community college ……(finance) by the local community in different professions.
3) In the technical training institution high school graduates……(may, take) courses ranging from six months to three-four years.
4) The academic year ……(be) usually nine months, divided into two terms.
5) These courses or subjects …….(call) major subjects or "majors".
6) . Credits ……..(earn) by attending lectures or laboratory classes and completing assignments and examinations.
7) Students who study at a university or four-year college …….. (know) as undergraduates.
8) They ……..(may, take) graduate program for another 2 years in order to get a master's degree.

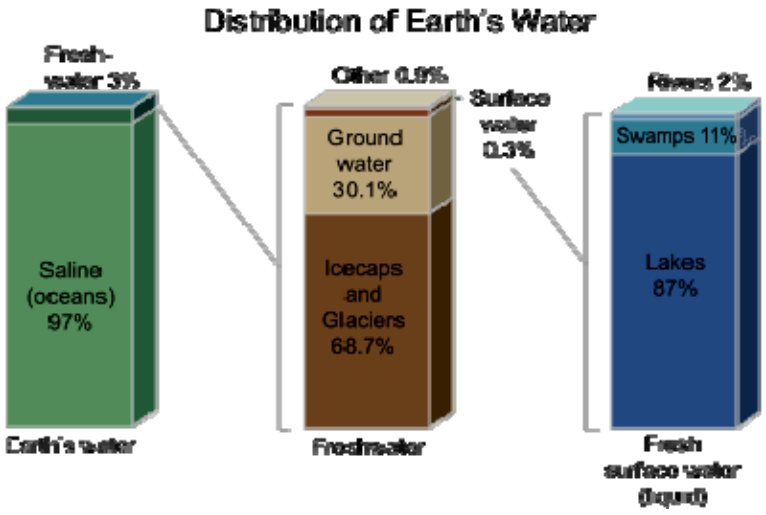
UNIT 3. Water and its properties

3.1 Water

Task 1. Read and translate the text.

Water is a chemical compound with the chemical formula H_2O. A water molecule contains one oxygen and two hydrogen atoms connected by covalent bonds. Water is a liquid at standard ambient temperature and pressure, but it often co-exists on Earth with its solid state, ice, and gaseous state (water vapor or steam). Water also exists in a liquid crystal state near hydrophilic surfaces.

Water covers 71% of the Earth's surface, and is vital for all known forms of life. On Earth, 96.5% of the planet's water is found in oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps of Antarctica and Greenland, a small fraction in other large water bodies, and 0.001% in the air as vapor, clouds (formed of solid and liquid water particles suspended in air), and precipitation. Only 2.5% of the Earth's water is freshwater, and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products.



Water on Earth moves continually through the water cycle of evaporation and transpiration, condensation, precipitation, and runoff, usually reaching the sea. Evaporation and transpiration contribute to the precipitation over land.

Safe drinking water is essential to humans and other life forms even though it provides no calories or organic nutrients. Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to safe water and over 2.5 billion lack access to adequate sanitation. There is a clear correlation between access to safe water and GDP per capita. However, some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability. A recent report (November 2009) suggests that by 2030, in some developing regions of the world, water demand will exceed supply by 50%. Water plays an important role in the world economy, as it functions as a solvent for a wide variety of chemical substances and facilitates industrial cooling and transportation. Approximately 70% of the fresh water used by humans goes to agriculture.

Task 2. Answer the questions

1. What is water?
2. What does a water molecule contain?
3. Why is water vital for all known forms?
4. Where on earth is water found in?
5. How many percent of the earth water is fresh water? Ice? Groundwater?
6. What does water on earth move through?
7. What do evaporation and transpiration contribute to?
8. What year will more than half of the world population be facing water-based vulnerability by?
9. Why does water play an important role in the world economy?

Task 3**.** Match the left column with the right one according to the text**.**

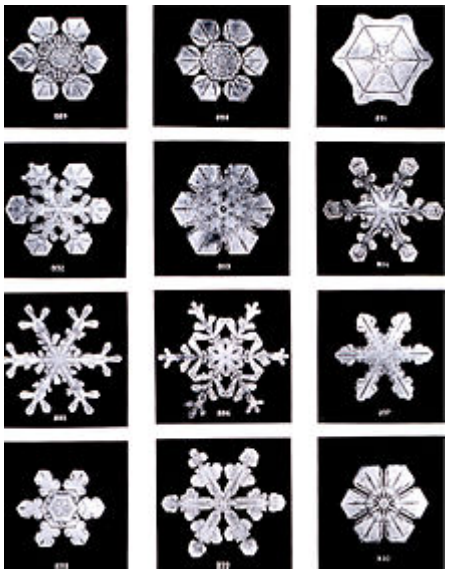
A water molecule contains	is freshwater
Water covers	contribute to the precipitation over land.
Only 2.5% of the Earth's water	in the world economy
Evaporation and transpiration	essential to humans
Safe drinking water is	one oxygen and two hydrogen atoms connected by covalent bonds
Water plays an important role	71% of the Earth's surface

Task 4. Put the verbs into the correct form (Present Simple, Past Simple, Present Perfect)

1) A water molecule …….. (contain) one oxygen and two hydrogen atoms connected by covalent bonds.
2) Water also …….(exist) in a liquid crystal state near hydrophilic surfaces.
3) Only 2.5% of the Earth's water ……(be) freshwater, and 98.8% of that water ……(be) in ice and groundwater.
4) Access to safe drinking water ……..(improve) over the last decades in almost every part of the world.
5) People ……..(not/ look after) water in the past.
6) Water …….(play) an important role in the world economy, as it ……(function) as a solvent for a wide variety of chemical substances and …….(facilitate) industrial cooling and transportation.

3.2 Chemical and physical properties of water

Task 1. Read and translate the text.



Snowflakes by Wilson Bentley, 1902

Water is the chemical substance with chemical formula H_2O: one molecule of water has two hydrogen atoms covalently bonded to a single oxygen atom.

Water appears in nature in all three common states of matter (solid, liquid, and gas) and may take many different forms on Earth: water vapor and clouds in the sky,

seawater in the oceans, icebergs in the polar oceans, glaciers and rivers in the mountains, and the liquid in aquifers in the ground.

The major chemical and physical properties of water are:

- Water is a liquid at standard temperature and pressure. It is tasteless and odorless. The intrinsic colour of water and ice is a very slight blue hue, although both appear colorless in small quantities. Water vapour is essentially invisible as a gas.

- Water is transparent in the visible electromagnetic spectrum. Thus aquatic plants can live in water because sunlight can reach them. Infrared light is strongly absorbed by the hydrogen-oxygen or OH bonds.

- Since the water molecule is not linear and the oxygen atom has a higher electronegativity than hydrogen atoms, it carries a slight negative charge, whereas the hydrogen atoms are slightly positive. As a result, water is a polar molecule with an electrical dipole moment. Water also can form an unusually large number of intermolecular hydrogen bonds (four) for a molecule of its size. These factors lead to strong attractive forces between molecules of water, giving rise to water's high surface tension and capillary forces. The capillary action refers to the tendency of water to move up a narrow tube against the force of gravity. This property is relied upon by all vascular plants, such as trees.

- Water is a good polar solvent and is often referred to as *the universal solvent*. Substances that dissolve in water, e.g., salts, sugars, acids, alkalis, and some gases – especially oxygen, carbon dioxide (carbonation) are known as *hydrophilic* (water-loving) substances, while those that are immiscible with water (e.g., fats and oils), are known as *hydrophobic* (water-fearing) substances.

- Most of the major components in cells (proteins, DNA and polysaccharides) are also dissolved in water.

- Pure water has a low electrical conductivity, but this increases with the dissolution of a small amount of ionic material such as sodium chloride.
- The boiling point of water (and all other liquids) is dependent on the barometric pressure. For example, on the top of Mt. Everest water boils at 68 °C (154 °F), compared to 100 °C (212 °F) at sea level. Conversely, water deep in the ocean near geothermal vents can reach temperatures of hundreds of degrees and remain liquid.
- At 4181.3 J/(kg·K), water has a high specific heat capacity, as well as a high heat of vaporization (40.65 $kJ \cdot mol^{-1}$), both of which are a result of the extensive hydrogen bonding between its molecules. These two unusual

properties allow water to moderate Earth's climate by buffering large fluctuations in temperature.

- The maximum density of water occurs at 3.98 °C (39.16 °F). It has the anomalous property of becoming less dense, not more, when it is cooled to its solid form, ice. During freezing, the 'open structure' of ice is gradually broken and molecules enter cavities in ice-like structure of low temperature water. There are two competing effects: 1) Increasing volume of normal liquid and 2) Decrease overall volume of the liquid. Between 0 and 3.98 °C, the second effect will cancel off the first effect so the net effect is shrinkage of volume with increasing temperature. It expands to occupy 9% greater volume in this solid state, which accounts for the fact of ice floating on liquid water, as in icebergs.

- The density of liquid water is 1,000 kg/m^3 (62.43 lb/cu ft) at 4 °C. Ice has a density of 917 kg/m^3 (57.25 lb/cu ft).

- Water is miscible with many liquids, such as ethanol, in all proportions, forming a single homogeneous liquid. On the other hand, water and most oils are immiscible, usually forming layers according to increasing density from the top. As a gas, water vapor is completely miscible with air.

- Water forms an azeotrope with many other solvents.

- Water can be split by electrolysis into hydrogen and oxygen.

- As an oxide of hydrogen, water is formed when hydrogen or hydrogen-containing compounds burn or react with oxygen or oxygen-containing compounds. Water is not a fuel, it is an end-product of the combustion of hydrogen. The energy required to split water into hydrogen and oxygen by electrolysis or any other means is greater than the energy that can be collected when the hydrogen and oxygen recombine.

- Elements which are more electropositive than hydrogen such as lithium, sodium, calcium, potassium and caesium displace hydrogen from water, forming hydroxides. Being a flammable gas, the hydrogen given off is dangerous and the reaction of water with the more electropositive of these elements may be violently explosive.

Task 2. Answer the questions

1. What is water?
2. What does water appear in nature in?
3. What forms on earth may water take?
4. What are the major chemical and physical properties of water?
5. What density does liquid water have?

Task 3. Fill in the appropriate word(s) from the list. Use the word(s) only once.

States to take chemical and physical small infrared strong attractive good polar electrical the maximum density

……..of matter ……forces

……..of water ……many different forms

……..light ……properties

……..quantities ……solvent

……..conductivity

Task 4. Put the verbs into Active or Passive voice

1) Water ……(appear) in nature in all three common states of matter (solid, liquid, and gas) and may take many different forms on Earth.
2) Infrared light ……. strongly ……..(absorb) by the hydrogen-oxygen or OH bonds.
3) . For example, on the top of Mt. Everest water ……(boil) at 68 °C (154 °F), compared to 100 °C (212 °F) at sea level.
4) Substances that dissolve in water, e.g., salts, sugars, acids, alkalis, and some gases – especially oxygen, carbon dioxide (carbonation) ……(know) as *hydrophilic* (water-loving) substances.
5) These two unusual properties ……(allow) water to moderate Earth's climate by buffering large fluctuations in temperature.
6) . During freezing, the 'open structure' of ice …. gradually ……(break) and molecules …….(enter) cavities in ice-like structure of low temperature water.
7) As an oxide of hydrogen, water ……..(form) when hydrogen or hydrogen-containing compounds ……..(burn) or (react) with oxygen or oxygen-containing compounds.
8) The energy required to split water into hydrogen and oxygen by electrolysis or any other means is greater than the energy that ……..(can collect) when the hydrogen and oxygen recombine.

3.3 Freshwater environmental quality parameters

Task 1. Read and translate the text.

Freshwater environmental quality parameters are the natural and man-made chemical, biological and microbiological characteristics of rivers, lakes and ground-waters, the ways they are measured and the ways that they change. The values or concentrations attributed to such parameters can be used to describe the pollution status of an environment, its biotic status or to predict the likelihood or otherwise of a particular organisms being present. Monitoring of environmental quality parameters is a key activity in managing the environment, restoring polluted environments and anticipating the effects of man-made changes on the environment.

0 B

Filling a clean bottle with river water is a very simple task, but a single sample is only representative of that point along the river the sample was taken from and at that point in time. Understanding the chemistry of a whole river, or even a significant tributary, requires prior investigative work to understand how homogeneous or mixed the flow is and to determine if the quality changes during the course of a day and during the course of a year. Almost all natural rivers will have very significant patterns of change through the day and through the seasons. Many rivers also have a very large flow that is unseen. This flows through underlying gravel and sand layers and is called the hyporheic zone How much mixing there is between the hyporheic zone and the water in the open channel will depend on a variety of factors, some of which relate to flows leaving aquifers which may have been storing water for many years.

Ground waters by their very nature are often very difficult to access to take a sample. As a consequence the majority of ground-water data comes from samples taken from springs, wells, water supply bore-holes and in natural caves. In recent decades as the need to understand ground water dynamics has increased, an increasing number or monitoring bore-holes have been drilled into aquifers

1

Lakes and ponds can be very large and support a complex eco-system in which environmental parameters vary widely in all three physical dimensions and with time. Large lakes in the temperate zone often stratify in the warmer months into a warmer upper layers rich in oxygen and a colder lower layer with low oxygen levels. In the autumn, falling temperatures and occasional high winds result in the mixing of the two layers into a more homogeneous whole. When stratification occurs it not only affects oxygen levels but also many related parameters such as iron, phosphate and manganese which are all changed in their chemical form by change in the redox potential of the environment.

Lakes also receive waters, often from many different sources with varying qualities. Solids from stream inputs will typically settle near the mouth of the stream and depending on a variety of factors the incoming water may float over the surface of the

lake, sink beneath the surface or rapidly mix with the lake water. All of these phenomena can skew the results of any environmental monitoring unless the process are well understood.

2

Where two rivers meet at a confluence there exists a mixing zone. A mixing zone may be very large and extend for many miles as in the case of the Mississippi and Missouri rivers in the United States and the River Clwyd and River Elwy in North Wales. In a mixing zone water chemistry may be very variable and can be difficult to predict. The chemical interactions are not just simple mixing but may be complicated by biological processes from submerged macrophytes and by water joining the channel from the hyporheic zone or from springs draining an aquifer.

3

The geology that underlies a river or lake has a major impact on its chemistry. A river flowing across very ancient precambrian schists is likely to have dissolved very little from the rocks and maybe similar to de-ionised water at least in the headwaters. Conversely a river flowing through chalk hills, and especially if its source is in the chalk, will have a high concentration of carbonates and bicarbonates of Calcium and possibly Magnesium.

As a river progresses along its course it may pass through a variety of geological types and it may have inputs from aquifers that do not appear on the surface anywhere in the locality.

4

Oxygen is probably the most important chemical constituent of surface water chemistry, as all aerobic organisms require it for survival. It enters the water mostly via diffusion at the water-air interface. Oxygen's solubility in water decreases as water temperature increases. Fast, turbulent streams expose more of the water's surface area to the air and tend to have low temperatures and thus more oxygen than slow, backwaters. Oxygen is a by-product of photosynthesis, so systems with a high abundance of aquatic algae and plants may also have high concentrations of oxygen during the day. These levels can decrease significantly during the night when primary producers switch to respiration. Oxygen can be limiting if circulation between the surface and deeper layers is poor, if the activity of animals is very high, or if there is a large amount of organic decay occurring such as following Autumn leaf-fall.

Most other atmospheric inputs come from man-made or anthropogenic sources the most significant of which are the oxides of sulphur produced by burning sulphur rich fuels such as coal and oil which give rise to acid rain. The chemistry of sulphur oxides is complex both in the atmosphere and in river systems. However the effect on

the overall chemistry is simple in that it reduces the pH of the water making it more acidic. The pH change is most marked in rivers with very low concentrations of dissolved salts as these cannot buffer the effects of the acid input. Rivers downstream of major industrial conurbations are also at greatest risk. In parts of Scandinavia and West Wales and Scotland many rivers became so acidic from oxides of sulphur that most fish life was destroyed and pHs as low as pH4 were recorded during critical weather conditions.

5

The majority of rivers on the planet and many lakes have received or are receiving inputs from human-kind's activities. In the industrialised world, many rivers have been very seriously polluted, at least during the 19th and the first half of the 20th centuries. Although in general there has been much improvement in the developed world, there is still a great deal of river pollution apparent on the planet.

6

In most environmental situations the presence or absence of an organism is determined by a complex web of interactions only some of which will be related to measurable chemical or biological parameters. Flow rate, turbulence, inter and intra specific competition, feeding behaviour, disease, parasatism, commensalism and symbiosis are just a few of the pressures and opportunities facing any organism or population. Most chemical constituents favour some organisms and are less favourable to others. However there are some cases where a chemical constituent exerts a toxic effect. i.e. where the concentration can kill or severely inhibit the normal functioning of the organism. Where a toxic effect has been demonstrated this may be noted in the sections below dealing with the individual parameters.

7

Good quality freshwater is important for health, economic prosperity, and personal enjoyment. It supports a wide range of activities, from energy production and industrial processing to tourism and recreation. It is also important for agriculture and the maintenance of healthy ecosystems, as well as for drinking and household use. Poor water quality affects aquatic life and the availability of water for human consumption and economic activities. In terms of usage, heavy water use can result in high costs for supplying drinking water, treating wastewater, and maintaining or upgrading infrastructure. It can also result in changes in water levels and water quality.

Two indicators have been selected to provide a partial illustration of the quality and use of freshwater resources. The surface freshwater quality for aquatic life indicator provides information on the suitability of waters for sensitive aquatic organisms and the health of aquatic ecosystems in general. The residential water use indicator

provides information on daily residential water use per person and gives a partial measure of water use intensity and water conservation.

Task 2. Answre the questions

1) What are freshwater environmental quality parameters?
2) What is a key activity in managing the environment?
3) What are the mixing zones?
4) May a river progressing along its course have inputs from aquifers that do not appear on the surface?
5) Why is good quality freshwater important for us?

Task 3. Choose the most suitable heading from the list A-G for each part (1-6) of the text. There is one extra heading which you do not need to use. There is an example at the beginning (0).

A	**Geological inputs**
B	**Rivers**
C	**Anthropogenic inputs**
D	**Mixing zones**
E	**Lakes**
F	**Atmospheric inputs**
G	**Oceans**
H	**Freshwater Quality and Use**
I	**Toxicity**

3.4 On Earth

Task 1. Read and translate the text.

Water covers 71% of the Earth's surface; the oceans contain 96.5% of the Earth's water. The Antarctic ice sheet, which contains 61% of all fresh water on Earth, is visible at the bottom. Condensed atmospheric water can be seen as clouds, contributing to the Earth's albedo.

Hydrology is the study of the movement, distribution, and quality of water

throughout the Earth. The study of the distribution of water is hydrography. The study of the distribution and movement of groundwater is hydrogeology, of glaciers is glaciology, of inland waters is limnology and distribution of oceans is oceanography. Ecological processes with hydrology are in focus of ecohydrology.

The collective mass of water found on, under, and over the surface of a planet is called the hydrosphere. Earth's approximate water volume (the total water supply of the world) is 1,338,000,000 km^3 (321,000,000 mi^3).

Liquid water is found in bodies of water, such as an ocean, sea, lake, river, stream, canal, pond, or puddle. The majority of water on Earth is sea water. Water is also present in the atmosphere in solid, liquid, and vapor states. It also is hydrogeology, of glaciers is glaciology, of inland waters is limnology and distribution of oceans is oceanography. Ecological processes with hydrology are in focus of ecohydrology exists as groundwater in aquifers.

Water is important in many geological processes. Groundwater is present in most rocks, and the pressure of this groundwater affects patterns of faulting. Water in the mantle is responsible for the melt that produces volcanoes at subduction zones. On the surface of the Earth, water is important in both chemical and physical weathering processes. Water and, to a lesser but still significant extent, ice, are also responsible for a large amount of sediment transport that occurs on the surface of the earth. Deposition of transported sediment forms many types of sedimentary rocks, which make up the geologic record of Earth history.

Task 2. Answer the questions

1. What percent of the Earth's surface does water cover?
2. What bodies of water is liquid water found in?
3. What processes is water important in?
4. What is water in the mantle responsible for?

Task 3. Match the left column with the right one according to the text.

Hydrology	the study of the distribution and movement of groundwater
Hydrography	the study of the distribution and movement of inland waters
Hydrogeology	the study of the movement, distribution, and quality of water throughout the Earth.
glaciology	the study of the distribution of oceans
limnology	the study of the distribution and movement of glaciers
oceanography	the study of the distribution of water

3.5 Groundwater

Task 1. Read and translate the text.

Groundwater is water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations. A unit of rock or an unconsolidated deposit is called an aquifer when it can yield a usable quantity of water. The depth at which soil pore spaces or fractures and voids in rock become completely saturated with water is called the water table. Groundwater is recharged from, and eventually flows to, the surface naturally; natural discharge often occurs at springs and seeps, and can form oases or wetlands. Groundwater is also often withdrawn for agricultural, municipal and industrial use by constructing and operating extraction wells. The study of the distribution and movement of groundwater is hydrogeology, also called groundwater hydrology.

Typically, groundwater is thought of as liquid water flowing through shallow aquifers, but technically it can also include soil moisture, permafrost (frozen soil), immobile water in very low permeability bedrock, and deep geothermal or oil formation water. Groundwater is hypothesized to provide lubrication that can possibly influence the movement of faults. It is likely that much of the Earth's subsurface contains some water, which may be mixed with other fluids in some instances. Groundwater may not be confined only to the Earth. The formation of some of the landforms observed on Mars may have been influenced by groundwater. There is also evidence that liquid water may also exist in the subsurface of Jupiter's moon Europa.

Task 2. Answer the questions

1. What is groundwater?
2. What is aquifer?
3. What is the water table?
4. What does hydrogeology study?
5. What planets are mentioned in the text?

Task 3. Put the verbs into Passive voice

1) A unit of rock or an unconsolidated deposit ……....(call) an aquifer when it can yield a usable quantity of water.
2) Groundwater …….(recharge) from, and eventually flows to, the surface naturally; natural discharge often occurs at springs and seeps, and can form oases or wetlands.
3) Groundwater ……. also often (withdraw) for agricultural, municipal and industrial use by constructing and operating extraction wells.
4) Typically, groundwater ……(think) of as liquid water flowing through shallow aquifers.

5) . Groundwater ……..(hypothesize) to provide lubrication that can possibly influence the movement of faults.
6) Groundwater ……(may, not confine) only to the Earth.
7) The formation of some of the landforms observed on Mars …….(may, influence) by groundwater.

Unit 4 Drought

Task 1. Read and translate the text.

A drought is defined as an extended period of abnormally dry weather that causes water shortages and crop damage. A drought starts when total rainfall is well below average for several months. Other signs of drought include: unusually low river flows, low groundwater and reservoir levels, very dry soil, reduced crop yields or even crop failure, and algae blooms in reservoirs and lakes. Groundwater is not replenished because not enough rain is falling to wet the soil's entire surface area and to be absorbed properly.

Drought conditions lead to increased growth of algae in lakes, ponds and other slow-moving bodies of water. The water is no longer a safe place for fish and other aquatic life. Animals that drink from the rivers or streams can become sick and die; swimmers in affected waters may become ill. The ecology of an area may be affected by the drying of wetlands, with wading birds dying out. Crop production will be lower than usual; trees may die. Wildfires spring up; lack of irrigation can lead to famine and disease.

There have been a number of life-threatening droughts over the centuries. Cape Verde has suffered a number of droughts, and continues to suffer from erratic rainfall. Over 10,000 people starved to death due to droughts in the 1700s and 1800s, and a great many residents migrated to other areas.

In the early 1900s, drought led to the deaths of about 3 million people in India and 5 to 10 million people in the Soviet Union. In China, approximately 3 million people died from famine caused by drought in 1936.

America's "Dust Bowl" was a series of three droughts in the 1930s that forced the migration of large populations in the American Great Plains. Winds whipped up clouds of soil, called "dusters" or "black blizzards," crops were ruined and inhabitants suffered from dust-related health problems. The drought came on the heels of the Great Depression, battering an already impoverished population. John Steinbeck's The Grapes of Wrath told the story of the "Okies" who had to leave their homes and move to California.

Task 2. Answer the questions

1) What is a drought?

2) When does a drought start?
3) What does drought conditions lead to?
4) Why can animals become sick and die?
5) What can lack of irrigation lead to?
6) What life-threatening droughts do you know?

Task 3 Among thre options choose the most suitable synonym for the underlined word.

A drought is defined as an extended period of abnormally dry weather that causes water shortages and crop <u>damage</u>

a) Decrease b) fall c) destroy

.A drought <u>starts</u> when total rainfall is well below average for several months.

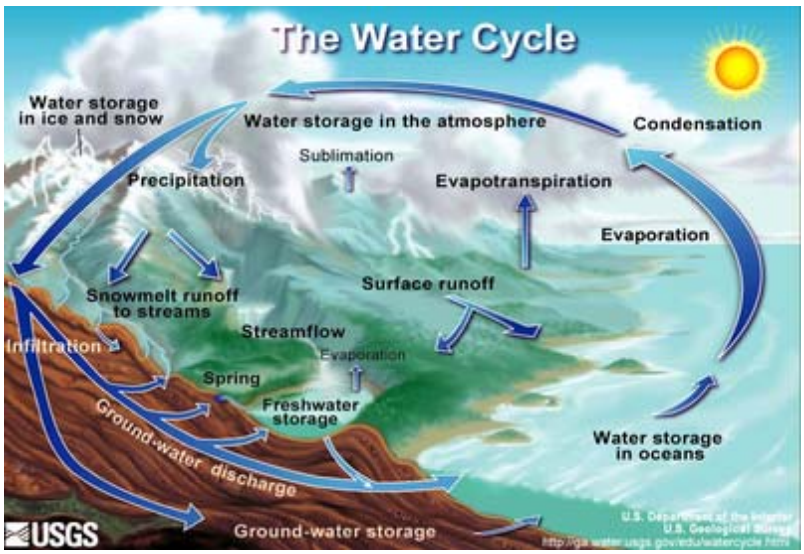
a)begins b)operates c)defines

The ecology of an area may be affected by the drying of wetlands, with wading birds dying out.

a) Influenced b)caused c)integrated

Unit 5 Water cycle

Task 1. Read and translate the text.



Water cycle

The water cycle (known scientifically as the **hydrologic cycle**) refers to the continuous exchange of water within the hydrosphere, between the atmosphere, soil water, surface water, groundwater, and plants.

Water moves perpetually through each of these regions in the *water cycle* consisting of following transfer processes:

- evaporation from oceans and other water bodies into the air and transpiration from land plants and animals into air.
- precipitation, from water vapor condensing from the air and falling to earth or ocean.
- runoff from the land usually reaching the sea.

Most water vapor over the oceans returns to the oceans, but winds carry water vapor over land at the same rate as runoff into the sea, about 47 Tt per year. Over land, evaporation and transpiration contribute another 72 Tt per year. Precipitation, at a rate of 119 Tt per year over land, has several forms: most commonly rain, snow, and hail, with some contribution from fog and dew. Dew is small drops of water that are condensed when a high density of water vapor meets a cool surface. Dew usually form in the morning when the temperature is the lowest, just before sunrise and when the temperature of the earth's surface starts to increase. Condensed water in the air may also refract sunlight to produce rainbows.

Water runoff often collects over watersheds flowing into rivers. A mathematical model used to simulate river or stream flow and calculate water quality parameters is hydrological transport model. Some of water is diverted to irrigation for agriculture. Rivers and seas offer opportunity for travel and commerce. Through erosion, runoff shapes the environment creating river valleys and deltas which provide rich soil and level ground for the establishment of population centers. A flood occurs when an area of land, usually low-lying, is covered with water. It is when a river overflows its banks or flood from the sea. A drought is an extended period of months or years when a region notes a deficiency in its water supply. This occurs when a region receives consistently below average precipitation.

Some runoff water is trapped for periods of time, for example in lakes. At high altitude, during winter, and in the far north and south, snow collects in ice caps, snow pack and glaciers. Water also infiltrates the ground and goes into aquifers. This groundwater later flows back to the surface in springs, or more spectacularly in hot springs and geysers. Groundwater is also extracted artificially in wells. This water storage is important, since clean, fresh water is essential to human and other land-based life. In many parts of the world, it is in short supply.

Task 2. Answer the Questions

1. What does he water cycle refer to? Describe each process.

2. What transfer processes does the *water cycle* consist of ?
3. What forms does precipitation have?
4. What is a drought?
5. Why is fresh water so important in our life?

Task 3. Match the left column with the right one according to the text.

Most water vapor over the ocean	of three transfer processes.
Precipitation has several forms:	when the temperature is the lowest.
The *water cycle* consists	returns to the oceans
Water runoff often collects over	most commonly rain, snow, and hail.
Dew usually form in the morning	watersheds flowing into rivers.
Water also infiltrates	artificially in wells.
Groundwater is also extracted	the ground and goes into aquifers.

Task 4. Put the verbs into Passive or Active voice

1) Water ……(move) perpetually through each of these regions in the *water cycle* consisting of three transfer processes.
2) Most water vapor over the oceans……..(return) to the oceans, but winds ……..(carry) water vapor over land at the same rate as runoff into the sea, about 47 Tt per year.
3) Dew is small drops of water that ……..(condense) when a high density of water vapor ……(meet) a cool surface.
4) Condensed water in the air may also …….(refract) sunlight to produce rainbows.
5) Some of water …….(divert) to irrigation for agriculture.
6) Through erosion, runoff ……..(shape) the environment creating river valleys and deltas which …….(provide) rich soil and level ground for the establishment of population centers.
7) This ……(occur) when a region …….(receive) consistently below average precipitation.
8) Some runoff water ……(trap) for periods of time, for example in lakes.

Unit 6. World Water Crisis: Is There a Way Out?

Task 1. Read and translate the text.

Introduction

by Peter Rogers, Gordon McKay Professor of Environmental Engineering and Professor of City Planning at Harvard University.

Of all the social and natural crises we humans face, the water crisis is the one that lies at the heart of our survival and that of our planet Earth.

Such was the dismal state of the world's water supply, as presented in a press release by Koichiro Matsuura, director general of UNESCO, on March 5, 2003. Matsuura later warned, “Over the next 20 years, the average supply of water worldwide per person is expected to drop by a third.” For years there had been warnings of an ever-worsening crisis in the availability of water on planet Earth, and in making 2003 the International Year of Freshwater, the UN gave the issue global prominence. The signs are troubling. Rapid rates of population growth worldwide, rapidly growing income in many countries, and consequent rapid urbanization have led to highly stressed water systems. (See Map—>.) It has been estimated that 2.3 billion people live in areas where there is not enough water available to meet basic needs of drinking, sanitation, hygiene, and food production—defined as 1,700 cu m (2,200 cu yd) per person per year. Some 1.7 billion people live under true water scarcity, where the supply is less than 1,000 cu m (1,300 cu yd) of water per person per year. Under conditions of scarcity, lack of water begins to hamper economic development as well as human health and well-being. All of these troubling signs are magnified by the possibility that we may be entering a period of rapid human-induced climatic change, with very uncertain implications for water-resource management in the future.

In 2000 the UN General Assembly set a goal “to halve the proportion of people without access to safe drinking water by the year 2015,” and in 2002 the UN World Summit on Sustainable Development approved a supplementary goal of halving “the proportion of people without access to basic sanitation.” The UN estimates that 1.1 billion people do not have access to safe drinking water (defined as meeting minimal standards of bacterial and chemical quality) and that 2.4 billion people do not have adequate sanitation. Cutting these numbers by 50%—while at the same time increasing food production, reducing poverty, and sustaining the ecosystem—is an ambitious goal. Hasty, ill-conceived responses may only exacerbate the problem, and so the best response at this time may be to think clearly about the nature of the water crisis and to evaluate possible solutions.

Do the Numbers Add Up?

On the face of it, the current water crisis as presented by the UN is a classic

Malthusian dilemma: a geometrically expanding population will soon meet the limits of a fixed supply of water. Yet Malthusian predictions of famine and other catastrophes have been made since the principle was first enunciated in 1798, and no such prediction has ever come true. Take the UN's claim that demand for water is growing at an unsustainable rate. This is due in part to rising population, which is due in turn to increasing life expectancy. Yet rising life expectancies are an effect of improvements in many areas, such as nutrition, hygiene, health services, and income. Could such improvements really have taken place if water supply and sanitation were deteriorating on the scale described by the UN?

Consider also the UN's drinking water and sanitation goals, described above. In order to reduce by 50% the number of people without access to safe drinking water and sanitation facilities, we need an estimate of what the current number is and what it will be over time. Unfortunately, the numbers cited above are very much in question, and even the definitions of access, safe, and sanitation facilities are open to interpretation.

Is the Water Blue, Green, or Brown?

In 1995 Swedish hydrologist Malin Falkenmark made a revolutionary contribution to hydrologic studies by distinguishing blue water, by which she meant all precipitation that contributes to stream runoff and groundwater and is readily withdrawn for human use, from green water, which is all precipitation that is transpired by vegetation or evaporated from the soil and other surfaces where it falls. Less than 40% of all rain falling each year on the land surface of the globe is blue water, and more than 60% is green water. Brown water, on the other hand, is all blue water that is contaminated by human use and then returned to the surface water system.

The most obvious path out of the water crisis would involve massive investments in infrastructure to store, transform, and transport blue water—in other words, more storage reservoirs, dams, desalination plants, and groundwater exploitation. Indeed, recent developments in desalination techniques—for instance, at the huge Tampa Bay (Fla.) Seawater Desalination Plant, which began operation in 2003—indicate that any urban area with access to saltwater can have a plentiful freshwater supply at reasonable cost. Another option is to expand the recycling of urban wastewater and industrial water (brown water). Yet another promising option might be to bring supplemental irrigation (blue water) to areas of rain-fed agriculture (green water). Substantial increases in food production could be achieved, and (assuming international trade was favourable) more food could be exported from rain-rich areas to rain-poor areas. This scenario leads to the concept of virtual water.

Consider Virtual Water.

According to British hydrologist J.A. Allan, a country that imports food crops is

essentially importing the water that was used to grow the crops in the exporting country. This virtual water can amount to as much as 1,000 to 5,000 tons of water per ton of crop imported. Virtual water, acquired as food and agricultural products through global food trade, can actually help to overcome disparities in water resources. Instead of spending large sums on irrigation, some countries would be better served by importing food crops from water-rich areas and saving their own dwindling water resources for human consumption.

Water Conflict.

Some 40% of the global population lives within river basins that are shared by two or more countries. Often one country is water-rich and the other water-poor, or one supports heavily polluting industries while the other does not. Since there is no strong international law governing the resolution of transboundary water disputes, the potential for conflict remains high. Indeed, the World Water Development Report sees poor governance and lack of political will as the most important thread running through all aspects of the water crisis.

Not All Gloom and Doom.

Into the gloom of the future we should project a little light by considering some successes of the past. Over the past 40 years, water resources and water quality have been greatly improved in Europe and North America. Rivers in the United States no longer spontaneously burst into flame; gross pollution of lakes and rivers has been eliminated; wetlands are protected and improved; and industrial and domestic wastes are under strict abatement levels. These achievements were not the result of immediate crash programs. Instead, they were reached step-by-step, solving the most serious problems before moving on to the next level. Such an approach might also be applicable to less-developed countries, where, unfortunately, many people expect almost instantaneous improvement. Victory in that arena would not be cheap or easy, but the benefits in health, well-being, and peaceful coexistence would be immense.

Task 2. Answer the questions

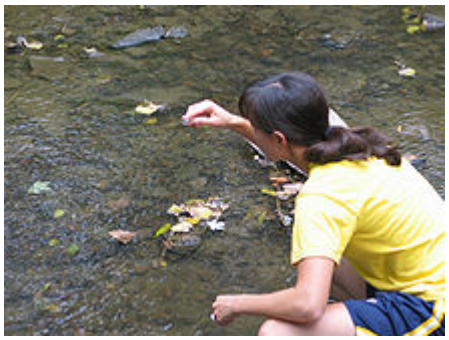
1) What did Matsuura warn about?
2) What have led to highly stressed water systems?
3) What begins to hamper economic development and human health?
4) How many people do not have access to safe drinking water?
5) Why is demand for water growing at an unsustainable rate?
6) Where have been water resources and water quality greatly improved over the past 40 years?

Task 3. Put the verbs into appropriate tense: Present Simple, Continuous, Past Simple, Present Perfect, Past Perfect, Active or Passive voice.

1) Matsuura later warned, “Over the next 20 years, the average supply of water worldwide per person ……..(expect) to drop by a third.”
2) For years there ……..(be) warnings of an ever-worsening crisis in the availability of water on planet Earth.
3) The signs …….(trouble).
4) Rapid rates of population growth worldwide, rapidly growing income in many countries, and consequent rapid urbanization ……..(lead) to highly stressed water systems.
5) All of these troubling signs ……(magnife) by the possibility that we may be entering a period of rapid human-induced climatic change.
6) Some 1.7 billion people …….(live) under true water scarcity.
7) The UN ……(estimate) that 1.1 billion people ……(not, have) access to safe drinking water (defined as meeting minimal standards of bacterial and chemical quality) and that 2.4 billion people ……(not, have) adequate sanitation.
8) Over the past 40 years, water resources and water quality ……... (improve) in Europe and North America.
9) Substantial increases in food production ……(can, achieve), and (assuming international trade was favourable) more food …….. (can, export) from rain-rich areas to rain-poor areas.
10) Rivers in the United States no longer spontaneously ……(burst) into flame; gross pollution of lakes and rivers ……. (eliminate); wetlands ……..(protect and improve); and industrial and domestic wastes are under strict abatement levels.

Unit 7. Health and pollution

Task 1. Read and translate the text.



Water fit for human consumption is called drinking water or potable water. Water that is not potable may be made potable by filtration or distillation, or by a range of other methods.

Water that is not fit for drinking but is not harmful for humans when used for swimming or bathing is called by various names other than potable or drinking water, and is sometimes called safe water, or "safe for bathing". Chlorine is a skin and

mucous membrane irritant that is used to make water safe for bathing or drinking. Its use is highly technical and is usually monitored by government regulations (typically 1 part per million (ppm) for drinking water, and 1–2 ppm of chlorine not yet reacted with impurities for bathing water). Water for bathing may be maintained in satisfactory microbiological condition using chemical disinfectants such as chlorine or ozone or by the use of ultraviolet light.

In the USA, non-potable forms of wastewater generated by humans may be referred to as greywater, which is treatable and thus easily able to be made potable again, and blackwater, which generally contains sewage and other forms of waste which require further treatment in order to be made reusable. Greywater composes 50–80% of residential wastewater generated by a household's sanitation equipment (sinks, showers and kitchen runoff, but not toilets, which generate blackwater.) These terms may have different meanings in other countries and cultures.

This natural resource is becoming scarcer in certain places, and its availability is a major social and economic concern. Currently, about a billion people around the world routinely drink unhealthy water. Most countries accepted the goal of halving by 2015 the number of people worldwide who do not have access to safe water and sanitation during the 2003 G8 Evian summit. Even if this difficult goal is met, it will still leave more than an estimated half a billion people without access to safe drinking water and over a billion without access to adequate sanitation. Poor water quality and bad sanitation are deadly; some five million deaths a year are caused by polluted drinking water. The World Health Organization estimates that safe water could prevent 1.4 million child deaths from diarrhea each year. Water, however, is not a finite resource, but rather re-circulated as potable water in precipitation in quantities many degrees of magnitude higher than human consumption. Therefore, it is the relatively small quantity of water in reserve in the earth (about 1% of our drinking water supply, which is replenished in aquifers around every 1 to 10 years), that is a non-renewable resource, and it is, rather, the distribution of potable and irrigation water which is scarce, rather than the actual amount of it that exists on the earth. Water-poor countries use importation of goods as the primary method of importing water (to leave enough for local human consumption), since the manufacturing process uses around 10 to 100 times products' masses in water.

In the developing world, 90% of all wastewater still goes untreated into local rivers and streams. Some 50 countries, with roughly a third of the world's population, also suffer from medium or high water stress, and 17 of these extract more water annually than is recharged through their natural water cycles. The strain not only affects surface freshwater bodies like rivers and lakes, but it also degrades groundwater resources.

Task 2. Put the words into correct form (Superlative and Comparative)

1) Drinking water is ……..(important) than non-portable water.

2) It ……..(harmful) to drink water from *aquifers* than from wells.
3) Greywater ……..(useful) than blackwater.
4) It …….(healthy) to drink filtered water.
5) This natural resource is becoming …….. (scarce) in certain places, and its availability is a major social and economic concern.

Task 3. Answer the questions

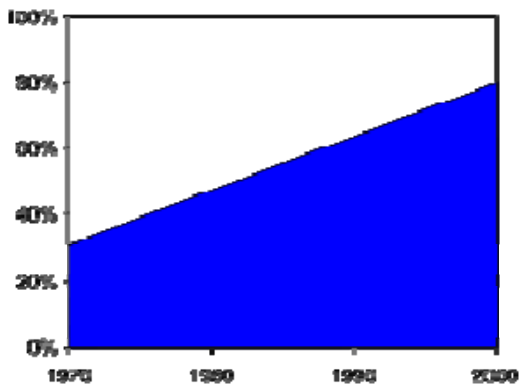
1. What is portable water?
2. How can we make portable water from other recourses of water?
3. What substance can be used to make water safe for bathing or drinking?
4. How many people around the world routinely drink unhealthy water?
5. How many deaths a year are caused by polluted drinking water?
6. What does The World Health Organization estimate?

Task 4. Put the verbs into correct form (Present Simple, Present Continuous, Past Simple)

1. Water fit for human consumption …….. (be) called drinking water or potable water.
2. Greywater ……. (compose) 50–80% of residential wastewater generated by a household's sanitation equipment.
3. This natural resource ……. (become) scarcer now in certain places, and its availability …….(be) a major social and economic concern.
4. Currently, about a billion people around the world routinely ……. (drink) unhealthy water.
5. Most countries ……(accept) the goal of halving by 2015 the number of people worldwide who ……(not have) access to safe water and sanitation during the 2003 G8 Evian summit.
6. Water-poor countries …….(use) importation of goods as the primary method of importing water.

Task 1. Read and translate the text.

Water law, water politics and water crisis



An estimate of the share of people in developing countries with access to potable water 1970–2000. Water politics is politics affected by water and water resources. For this reason, water is a strategic resource in the globe and an important element in many political conflicts. It causes health impacts and damage to biodiversity.

1.6 billion people have gained access to a safe water source since 1990. The proportion of people in developing countries with access to safe water is calculated to have improved from 30% in 1970 to 71% in 1990, 79% in 2000 and 84% in 2004. This trend is projected to continue.[7] To halve, by 2015, the proportion of people without sustainable access to safe drinking water is one of the Millennium Development Goals. This goal is projected to be reached.

A 2006 United Nations report stated that "there is enough water for everyone", but that access to it is hampered by mismanagement and corruption. In addition, global initiatives to improve the efficiency of aid delivery, such as the Paris Declaration on Aid Effectiveness, have not been taken up by water sector donors as effectively as they have in education and health, potentially leaving multiple donors working on overlapping projects and recipient governments without empowerment to act.

The authors of the 2007 Comprehensive Assessment of Water Management in Agriculture cited poor governance as one reason for some forms of water scarcity. Water governance is the set of formal and informal processes through which decisions related to water management are made. Good water governance is primarily about knowing what processes work best in a particular physical and socioeconomic context. Mistakes have sometimes been made by trying to apply 'blueprints' that work in the developed world to developing world locations and contexts. The Mekong river is one example; a review by the International Water Management Institute of policies in six countries that rely on the Mekong river for water found that thorough and transparent cost-benefit analyses and environmental impact assessments were rarely undertaken. They also discovered that Cambodia's draft water law was much more complex than it needed to be.

The UN World Water Development Report (WWDR, 2003) from the World Water Assessment Program indicates that, in the next 20 years, the quantity of water available to everyone is predicted to decrease by 30%. 40% of the world's inhabitants currently have insufficient fresh water for minimal hygiene. More than 2.2 million people died in 2000 from waterborne diseases (related to the consumption of contaminated water) or drought. In 2004, the UK charity WaterAid reported that a child dies every 15 seconds from easily preventable water-related diseases; often this means lack of sewage disposal; see toilet.

Organizations concerned with water protection include International Water Association (IWA), WaterAid, Water 1st, American Water Resources Association. The International Water Management Institute undertakes projects with the aim of using effective water management to reduce poverty. Water related conventions are

United Nations Convention to Combat Desertification (UNCCD), International Convention for the Prevention of Pollution from Ships, United Nations Convention on the Law of the Sea and Ramsar Convention. World Day for Water takes place on 22 March and World Ocean Day on 8 June.

Task 2. Answer the questions

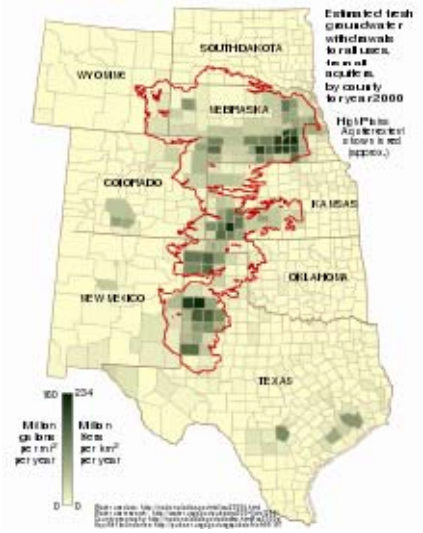
1. What is water politics?
2. How many people have gained access to a safe water source since 1990?
3. What trend is projected to continue?

Task 3. Put the verbs into the correct form (Passive or Active voice)

1. The proportion of people in developing countries with access to safe water …… (calculate) to have improved from 30% in 1970 to 71% in 1990, 79% in 2000 and 84% in 2004.
2. This trend ……..(project) to continue.
3. This goal ……..(project) to be reached.
4. The access to water ……. (hamper) by mismanagement and corruption.
5. Global initiatives to improve the efficiency of aid delivery, such as the Paris Declaration on Aid Effectiveness, …….(take up) by water sector donors as effectively as they have in education and health.
6. Water governance is the set of formal and informal processes through which decisions related to water management …….. (made).
7. In the next 20 years the quantity of water available to everyone ……(predict) to decrease by 30%.

Unit 8. Aquifers

Task 1. Read and translate the text.



Groundwater withdrawal rates from the Ogallala Aquifer in the central U.S.
Main article: Aquifer

An *aquifer* is a layer of porous substrate that contains and transmits groundwater. When water can flow directly between the surface and the saturated zone of an aquifer, the aquifer is unconfined. The deeper parts of unconfined aquifers are usually more saturated since gravity causes water to flow downward.

The upper level of this saturated layer of an unconfined aquifer is called the *water table* or *phreatic surface*. Below the water table, where generally all pore spaces are saturated with water, is the phreatic zone.

Substrate with low porosity that permits limited transmission of groundwater is known as an *aquitard*. An *aquiclude* is a substrate with porosity that is so low it is virtually impermeable to groundwater.

A *confined aquifer* is an aquifer that is overlain by a relatively impermeable layer of rock or substrate such as an aquiclude or aquitard. If a confined aquifer follows a downward grade from its *recharge zone*, groundwater can become pressurized as it flows. This can create artesian wells that flow freely without the need of a pump and rise to a higher elevation than the static water table at the above, unconfined, aquifer.

The characteristics of aquifers vary with the geology and structure of the substrate and topography in which they occur. Generally, the more productive aquifers occur in sedimentary geologic formations. By comparison, weathered and fractured crystalline rocks yield smaller quantities of groundwater in many environments. Unconsolidated to poorly cemented alluvial materials that have accumulated as valley-filling sediments in major river valleys and geologically subsiding structural basins are included among the most productive sources of groundwater.

The high specific heat capacity of water and the insulating effect of soil and rock can mitigate the effects of climate and maintain groundwater at a relatively steady temperature. In some places where groundwater temperatures are maintained by this effect at about 10°C (50°F), groundwater can be used for controlling the temperature inside structures at the surface. For example, during hot weather relatively cool groundwater can be pumped through radiators in a home and then returned to the ground in another well. During cold seasons, because it is relatively warm, the water can be used in the same way as a source of heat for heat pumps that is much more efficient than using air.

Task 2. Answer the questions

1. What is an *aquifer? water table? an aquitard ?an aquiclude? a confined aquifer?*

Task 3. Put the verbs into correct form (Passive or Active voices)

1) An *aquifer* is a layer of porous substrate that …….(contain) and …….(transmit) groundwater.

2) . The deeper parts of unconfined aquifers …….. usually more (saturate) since gravity ……(cause) water to flow downward.
3) Substrate with low porosity that …….. (permit) limited transmission of groundwater ……..(know) as an *aquitard*.
4) A *confined aquifer* ……..(be) an aquifer that ……(overlay) by a relatively impermeable layer of rock or substrate such as an aquiclude or aquitard.
5) Generally, the more productive aquifers …….(occur) in sedimentary geologic formations.
6) In some places where groundwater temperatures …….(maintain) by this effect at about 10°C (50°F), groundwater …….can (use) for controlling the temperature inside structures at the surface.

Task 1. Read and translate the text.

Water Pollution

Water pollution of groundwater, from pollutants released to the ground that can work their way down into groundwater, can create a contaminant plume within an aquifer. Movement of water and dispersion within the aquifer spreads the pollutant over a wider area, its advancing boundary often called a plume edge, which can then intersect with groundwater wells or daylight into surface water such as seeps and springs, making the water supplies unsafe for humans and wildlife. The interaction of groundwater contamination with surface waters is analyzed by use of hydrology transport models.

The stratigraphy of the area plays an important role in the transport of these pollutants. An area can have layers of sandy soil, fractured bedrock, clay, or hardpan. Areas of karst topography on limestone bedrock are sometimes vulnerable to surface pollution from groundwater. Earthquake faults can also be entry routes for downward contaminant entry. Water table conditions are of great importance for drinking water supplies, agricultural irrigation, waste disposal (including nuclear waste), wildlife habitat, and other ecological issues.

In the US, upon commercial real estate property transactions both groundwater and soil are the subjects of scrutiny, with a Phase I Environmental Site Assessment normally being prepared to investigate and disclose potential pollution issues. In the San Fernando Valley of California, real estate contracts for property transfer below the Santa Susana Field Laboratory (SSFL) and eastward have clauses releasing the seller from liability for groundwater contamination consequences from existing or future pollution of the Valley Aquifer.

Love Canal was one of the most widely known examples of groundwater pollution. In 1978, residents of the Love Canal neighbourhood in upstate New York noticed high rates of cancer and an alarming number of birth defects. This was eventually

traced to organic solvents and dioxins from an industrial landfill that the neighbourhood had been built over and around, which had then infiltrated into the water supply and evaporated in basements to further contaminate the air. Eight hundred families were reimbursed for their homes and moved, after extensive legal battles and media coverage.

Another example of widespread groundwater pollution is in the Ganges Plain of northern India and Bangladesh where severe contamination of groundwater by naturally occurring arsenic affects 25% of water wells in the shallower of two regional aquifers. The pollution occurs because aquifer sediments contain organic matter that generates anaerobic conditions in the aquifer. These conditions result in the microbial dissolution of iron oxides in the sediment and thus the release of the arsenic, normally strongly bound to iron oxides, into the water. As a consequence, arsenic-rich groundwater is often iron-rich, although secondary processes often obscure the association of dissolved arsenic and dissolved iron.

Task 2. Answer the questions

1) What cause the pollution of groundwater?
2) Why is pollution of groundwater is the subject of scrutinity?
3) What are the examples of groundwater pollution?

CONTENTS

Навчальне видання

Методичні вказівки для організації практичної роботи з дисципліни «Іноземна мова» (англійська мова)

(для студентів 1 курсу заочної форми навчання напряму підготовки «Гідротехника (водні ресурси)»)

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