HEALTH PROMOTION AND DISEASE PREVENTION **A Handbook for Teachers, Researchers, Health Professionals and Decision Makers**	
Title	**Supportive Environments for Health**
Module: 1.3	**ECTS: 0.5**
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Key words	environmental health, hazard, risk, environmental burden, action plan, local community, air pollution
Learning objectives	After completing this module students should: • identify environmental factors that potentially affect human health and explain the relationship between risk and hazard; • recognize the impact of environment on health and be able to list diseases with the largest environmental contribution worldwide and in developed countries as well; • acknowledge the significance of local community and importance of intersectoral approach in implementing measures to reduce environmental risks.

Abstract	The environment influences our health in many ways through exposures to physical, chemical and biological risk factors, and through related changes in our behavior in response to those factors. Globally, nearly one quarter of all deaths and of the total disease burden can be attributed to the environment. These findings have important policy implications, because the environmental risk factors can be modified by established, cost-effective interventions. The process of building an intersectoral approach, which recognizes all facets of a community, helps in both making and implementing a LEHAP. Coordinated actions can promote development strategies with multiple social and economic co-benefits, in addition to global health gains, both immediate and long term. Repositioning the health sector to act more effectively on preventive health policies, while enhancing intersectoral partnerships, is thus critical to addressing the environmental causes of disease and injury, and achieving better health for all. Our case study presents an example of intersectoral approach that resulted in a successful implementation of measures at different levels in local community to reduce air pollution in the urban area of Celje.
Teaching methods	Teaching methods include introductory lectures, exercises, and interactive methods such as small group discussions. After introductory lectures students should discuss etiology of diseases with the largest environmental contribution. Afterwards students should develope a model of local environmental health action plan for various environmental issues.
Specific recommendations for teachers	• work under teacher supervision/individual students' work proportion: 30%/70%; • facilities: a computer room; • equipment: computers (1 computer on 2-3 students), LCD projection equipment, internet connection, access to the bibliographic data-bases; • training materials: recommended readings are mainly available in the internet; • target audience: master degree students according to Bologna scheme.
Assessment of students	Assessment is based on seminar paper and oral exam.

SUPPORTIVE ENVIRONMENTS FOR HEALTH

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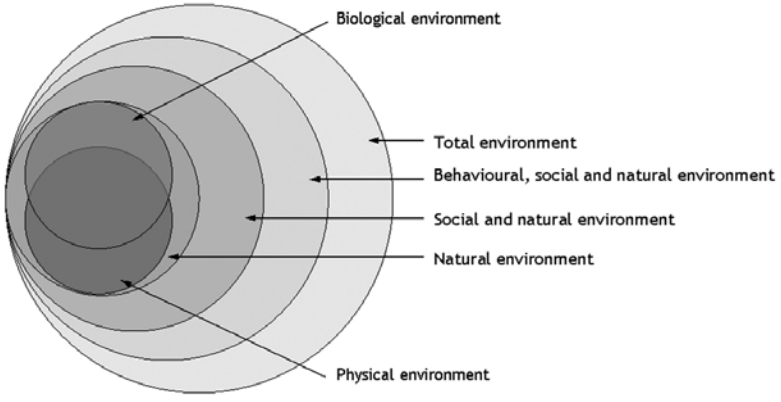
Theoretical background

Basic definitions

Environment

In the medical sense, the environment includes the surroundings, conditions or influences that affect an organism (1). Along these lines, Last defined the environment as: "All that which is external to the human host. It can be divided into physical, biological, social, cultural; any or all of which can influence health status of populations"(2). According to this definition, the environment would include anything that is not genetic, although it could be argued that even genes are influenced by the environment in the short or long term. Figure 1 shows one way to represent the environment, from the most inclusive to the most restrictive definition (3).

Figure 1. Definition of the environment (Adapted from Smith, Corvalan and Kjellstrom, 1999).



Environmental health

In 1989, World Health Organization (WHO) defined environmental health as comprising those aspects of human health and disease that are determined by factors in the environment (4). It also refers to the theory and practice of assessing and controlling environmental factors that have the potential to affect health.

List of basic environmental factors with potential to affect health:

- pollution of air, water, or soil with physical, chemical or biological agents;
- UV and ionizing radiation;
- electromagnetic fields;
- noise;
- built environments, including housing, land use patterns, roads;
- agricultural methods, irrigation schemes;
- man-made climate change, ecosystem change;
- emergencies related to bioterrorism and chemical terrorism.

Extended list of environmental factors with potential to affect health:

- alcohol and tobacco consumption, drug abuse;
- diet (although it could be argued that food availability influences diet);
- the natural environments of vectors that cannot reasonably be modified (e.g. in rivers, lakes, wetlands);
- natural biological agents, such as pollen in the outdoor environment;
- occupational risks.

Environmental health comprises those aspects of human health, including quality of life, that are determined by physical, biological, social, and psychosocial factors in the environment. It also refers to the theory and practice of assessing, correcting, controlling, and preventing those factors in the environment that can potentially affect adversely the health of present and future generations (5). Environmental health science is therefore essentially about two things: hazards in the environment, their effects on health, and the variations in sensitivity to exposures within populations, and the development of effective means to protect against hazards in the environment (6).

To establish environmental health in a country or region, governments must set and then implement policies to control environmental factors. The services needed to implement such policies can be developed in a variety of ways, depending on a number of social, economic and cultural factors.

Hazard, exposure and risk

How an environmental factor can affect human health could be described in terms of hazard, exposure and risk.

A hazard is defined as a factor that may adversely affect health (2); it is basically a source of danger. A hazard is a qualitative term expressing the potential of an environmental agent to harm the health of certain individuals if the exposure level is high enough and/or other conditions apply.

An exposure is defined as a condition of being subjected to an influencing experience.

Human exposure can occur through several routes, most importantly, inhalation, ingestion and skin contact (6).

A risk is defined as the probability that an event will occur, e.g., that an individual will become ill or die within a stated period of time; the probability of an unfavorable outcome (2). It is the quantitative probability that a health effect will occur after an individual has been exposed to a specified amount of a hazard. A hazard results in a risk if there has been exposure.

Exposure can occur in different environmental settings:

- homes;
- kindergartens and schools;
- working places;
- outdoor environments (playgrounds, recreational areas, roads, etc.);
- indoor recreational, hobby, entertainment environments;
- shopping centers;
- industrial, urban or rural settings.

Impact of environment on health

Worldwide, an estimated 24% of the disease burden (healthy life years lost) and an estimated 23% of all deaths (premature mortality) was attributable to environmental factors. Among children 0-14 years of age, the proportion of deaths attributed to the environment was as high as 36%. There were large regional differences in the environmental contribution to various disease conditions due to differences in environmental exposures and access to health care across the regions. For example, although 25% of all deaths in developing regions were attributable to environmental causes, only 17% of deaths were attributed to such causes in developed regions (7).

In many cases, the causal pathway between environmental hazard and disease outcome is complex. Therefore the exact estimates of disease burden attributable to environmental factors are difficult to observe.

Globally, diseases with the largest absolute burden attributable to environmental factors included: diarrhea, lower respiratory infections, other unintentional injuries, and malaria (Table 1). In developed countries, however, among the most frequent diseases related to environmental factors are cancer, allergies, asthma, chronic obstructive pulmonary disease and other respiratory diseases, and road traffic injuries (6, 7).

Table 1. List of diseases with the largest environmental contribution (Adapted from Pruss-Ustun A and Corvalàn FC, 2006; Figure 5).

Disease	Environmental fraction	Fraction of total global burden of disease in DALYs
Diarrhoea	3.85	4.15
Lower respiratory infections	2.45	6.10
Other unintentional injuries	1.40	3.30
Malaria	1.25	3.10
Road traffic injuries	1.05	2.60
Chronic obstructive pulmonary disease	0.80	1.80
Perinatal conditions	0.75	6.50
Ischaemic heart disease	0.75	3.90
Childhood cluster diseases	0.70	2.75
Lead-caused mental retardation	0.70	0.60
Drownings	0.55	0.70
HIV/AIDS	0.50	5.65
Malnutrition	0.50	1.15
Cerebrovascular disease	0.50	3.25
Asthma	0.45	1.05
Tuberculosis	0.45	2.25
Suicide	0.40	1.40
Depression	0.35	4.50
Poisonings	0.30	0.50
Falls	0.30	1.10
Hearing loss	0.25	1.75
Violence	0.25	1.45
Lymphatic filariasis	0.20	0.40
Lung cancer	0.20	0.75

Source: Pruss-Ustun A and Corvalàn FC, 2006.

What can policymakers and the public do about environmental risks

If the burden of disease from environmental risks can be estimated, the most important priorities for targeted environmental protection can also be evaluated, while helping to

promote the idea that sound environmental management plays a key role in protecting people's health (7). The role of environmental health professionals is to apply their knowledge and experience to help the community understand the environmental health hazards they face and to analyze the technical and social approaches to reducing or eliminating human exposure to environmental hazards and the resulting adverse health effects. On the basis of this analysis, other people in other jobs, some of them very far removed from environmental health can take appropriate action to protect a community's health (8,9). At the same time, actions by sectors such as energy, transport, agriculture, and industry are urgently required, in cooperation with the health sector, to address the root environmental causes of ill health. Acting together on the basis of coordinated health, environment and development policies, we can make a real difference in human well-being and quality of life.

Implementing environmental measures in local communities

Local authorities and their communities have assumed new responsibilities for global environmental problems, such as climate change, air and water pollution. They have joined some already existing international programs and established their own projects to address these challenges. Local communities with greater ecological awareness and a better information system can play a major role in solving environmental problems in heavily polluted areas (10). Local authorities are central to local environmental health planning because they often operate the economic, social and environmental infrastructure, oversee planning processes, establish local policies and regulations, determine parameters for economic development, are important vehicles in the development and implementation of local, regional and national policies, and work in a democratic manner (8, 11, 12). The process of implementing environmental measures in local communities is shown in Figure 2 and briefly described below.

Figure 2. Local environmental health action plan (LEHAP) process (Adapted from MacArthur, 2002).

Initially, a small group of committed professionals needs to come together to discuss and prepare the ground for the planning process. The group needs to have a basic level of information before making any approach to the political level. To secure political support, it must have some idea of the planning process, the time scales involved and, most importantly, the costs in financial and human resources. All of this undoubtedly helps the presentation of any proposed planning process to decision making politicians. Municipalities often have the main responsibility for ensuring healthy living environments, but they can only achieve this by working in partnership with other tiers of government, non governmental organizations, community based organizations, the private sector and so on. The idea that partnerships are essential to addressing environmental health issues effectively is now well established and widely accepted (8,13). The process of building an intersectoral approach, which recognizes all facets of a community, helps in both making and implementing a local environmental health action plan (LEHAP). The following list of organizations, which should participate in LEHAP:

- state or public health organizations and agencies;
- state environmental protection organizations and agencies;
- organizations and agencies responsible for: housing provision, transport, occupational health and safety, the supply and treatment of drinking-water, the treatment of wastewater, and the collection and disposal of solid industrial and domestic wastes;
- organizations and agencies representing particular sectors: commerce and business, industry, trade unions, agriculture and energy;
- NGOs addressing environmental health issues;
- community groups active in the locality;
- relevant departments or faculties in universities and schools;
- relevant international agencies active in the locality;
- neighboring local authorities or municipalities; and
- the mass media.

Case study - an example of a community action in controlling air pollution
Introduction

Environmental health issues are by nature multisectoral. Experience has shown that progress and success in addressing environmental health issues come only when all agencies, at all levels, work together. Another essential element of the environmental health approach is community participation. It not only involves local people more deeply, but also develops mutual understanding and respect among stakeholders, which can lead to greater local commitment and participation in solutions.

This case study presents an example of intersectoral approach that resulted in a successful implementation of measures at different levels in local community to reduce air pollution in the urban area of Celje, a Slovenian city with 55.000 inhabitants.

Celje has been an industrial city (production of TiO_2, ironworks) since the beginning of last century. The desire for industrial progress and development was so strong that almost no attention was paid to the damage caused to the environment. Unfortunately, the geographical position of Celje is not favorable; the city lies in a basin where the winds are weak, aggravating the concentration peaks of air pollutants. As a result, extensive pollution of air, surface waters, drinking water, and soil soon became the main limiting factor of further economic development of the region (14). For more than 30 years the community of Celje

has been making great effort to reduce all kinds of environmental pollution. The greatest improvement was made in reduction of air pollution.

Throughout all these years the emission and imission concentrations of sulfur dioxide (SO_2) have been reduced for more than 70%. Reduction of imission concentrations of SO_2, nitrogen oxides, and total air deposition followed the reduction of air emissions (14).

Now, 20 years later, the first results can be seen. Great progress has been made concerning the awareness of the population and the involvement of politicians in solving the problems. People have become more aware of the problems and are now determined to live in a healthier environment.

Chronological overview of systematic approach to reduce air pollution

The air in the city was polluted by more than 7000 small domestic furnaces, some tens of commercial furnaces, with the power of more than 0.2 MW, and by numerous industrial sources. The greatest were the production of titanium white based on sulfate procedure (1% of the world production of TiO_2), sulfuric acid production, ironworks, enamel factory, and ceramic industry.

The imission concentrations of SO_2 in winter used to exceed critical values stated by the national legislation. In the late 1970's the imission concentrations exceeded values as high as 4600 $mgSO_2/m^3$ (15).

It was very soon obvious that that air pollution has a considerable impact on other environmental elements especially such as soil, ground, and surface waters. Health problems related to air pollution were exceeding in comparison to other parts of Slovenia. This all together forced the local community to apply measures to reduce emissions in the air.

In 1968 a Commission was established by the city authorities to carry out clean up programs for water and air. One of the main objectives of this Commission was to identify sources of air pollution in Celje. In 1976 intensive measurements and analyses started to collect data to support public decisions.

A further step in this systematic approach was made in the year 1981 when Public Agreement for Conservation of Environment was reached. For ten years this agreement obliged all air and water polluters to take action to reduce pollution. The result was a considerable reduction in emission concentrations from industries and more powerful commercial furnaces. However, this Public Agreement had a major drawback: it neglected the problem of small domestic furnaces. One of the main reasons for this is the public misconception according to which industry (the production of TiO_2 and H_2SO_4) was the only air polluter in the city, which, of course, was not true.

The problem of small domestic furnaces was first dealt systematically by the Clean Air Program for the period between 1993 and 2000 (16,17). This program started in 1993 with the main objective to reduce emission concentrations to such an extent that by the year 1995 the 24-hour average imission concentrations of SO_2 would not exceed 375 $mgSO_2/m^3$ (critical value). In addition, by the year 2000 the average imission concentrations would be further reduced to 125 $mgSO_2/m^3$ (limited value).

The clean air plan

The technical basis for the development of the clean air program was a mathematical model for working out the imission concentrations of SO_2 based on the emission data. The amount of used fossil fuels was the basis for establishing the use of energy, which was later

converted into the use of another fuel. The equivalent use of other fuels was the basis on which corresponding emissions and imissions were worked out. The results showed that the emission concentrations in Celje must be reduced to less than 600 tons of SO_2 per heating season. To achieve this goal we had to set limits to the emissions from all industries and carry out the gasification of most furnaces in Celje (18).

The industries in Celje have been making efforts to reduce the emissions of SO_2 for years. After 1990 the intensive gasification of small domestic furnaces started. Between 1988 and 1996 more than 45 kilometers of gas pipeline network was built, the price of gas was subsidized by the local authorities, bank loans were available at a low interest rate so that individuals could connect to the gas pipeline network. The gasification network system was planned and developed according to the extent of SO_2 emissions at a certain city area.

Reductions in emissions of SO_2

The first SO_2 emission concentrations from industries were recorded back in 1945. In 1979 the first complete inventory of air pollutants was made. Initially this inventory included industries only, but was later on added with emissions data from furnaces. A complete emission inventory was also made in the years 1984, 1988 and 1993. Emissions of SO_2 in Celje between the years 1945 and 1993 can be seen in Table 2.

Table 2. Emissions of SO_2 in Celje between 1945 and 1993 (in tons of SO_2/year)

YEAR	Production of TiO_2 and H_2SO_4	Other industries	Commercial furnaces	Small domestic furnaces	TOTAL
1945	3000				
1956	8300				
1961	14000				
1979	4125	1002	430	450	6007
1981	3400	427	263	539	4620
1984	2783	427	288	830	4328
1988	2320	427	230	797	3774
1993	1160	5	103	499	1767

The total emission of SO_2 has constantly been reduced since 1979 and was, in 1993, lower by 70% compared to fourteen years earlier. However, the emissions increased in small domestic furnaces, which was due to a fault in the Public Agreement for Conservation of Environment (19).

Between the years 1979 and 1993 the relationship between polluters was changed. In the heating season of 1979 the proportion of SO_2 emissions was as follows: 60% of the total emission was caused by factory producing TiO_2 and H_2SO_4, 25% by furnaces, and 15% by other industries. Today the proportion of the rest of the industries can be neglected, the proportion between emission by factory producing TiO_2 and H_2SO_4 and furnaces is 50:50.

Changes in imission concentrations

The lower level of SO_2 emissions was necessarily reflected in the degree of air pollution. The measurements of SO_2 imission concentrations, which were carried out in the late 1960s, show a very high degree of air pollution by SO_2. In 1977 measurements at regular intervals started. The results of the latter show constant decrease in the imission concentrations of SO_2 in Celje and surrounding suburbs - Teharje (Table 3).

Table 3. Imission concentrations of SO2 at the measuring sites of Celje and Teharje as measured at national network measuring station (μg SO2/m3).

Celje				Teharje			
year	**annual average**	**24-h avg. 98-percentile**	**24-h avg. max. conc.**	**year**	**annual average**	**24-h avg. max. conc.**	**24-h avg. max. conc.**
Oct.67-sept.68+	280	1150	1570	1979	158	579	940
1978	160	530	740	1980	108	414	960
1979	150	750	1230	1981	123	616	890
1980	130	490	810	1982	78	267	400
1981	150	600	950	1983	66	270	380
1982	120	390	440	1984	73	268	360
1983	120	470	600	1985	70	359	600
1985	130	610	1060	1986	75	330	590
1986	60	230	480	1987	83	429	590
1987	100	410	680	1988	48	200	500
1988	50	250	380	1989	67	295	330
1989	60	360	470	1990	53	260	390
1990	50	270	360	1991	52	270	580
1992	30	70	220	1992	40	250	250
1993	50	200	340	1993	35	158	352
1994	38	147	237	1994	29	113	192
1995*	28	97	213	1995	40	111	192
1996*	25	74	88				

+ data from study »Air pollution in Celje and Štore (Hraševec 1968)

* data from EIS Celje

As one may observe, the imission concentrations (annual average values, concentrations of C98 and 24-hour maximum concentrations) showed a clearly decreasing trend.

Apart from measurements of imission concentrations of SO_2, the degree of air pollution in Celje was measured by series of other measurements organized in a local measuring network. The existing quantity and the types of measurements can be seen in Table 4.

Table 4. Air pollution measurements carried out by the local measuring network.

LOCATION	TYPE OF MEASUREMENT	PERIOD OF TIME
EIS Celje	SO_2	throughout the year
city's central automated measuring	NO_2, NO, NOx	throughout the year
site; system is equipped with public	CO	throughout the year
display	suspended particles	throughout the year
	Ca, Pb, Zn, Ti (particles)	throughout the year
Additional measuring network		
• four measuring sites	SO_2 , black smoke	throughout the year
• one measuring site	NO_2	throughout the year
• twelve measuring sites	total deposit + Cd, Pb, Zn; Ti in deposit	throughout the year

The local measuring network results

The most significant conclusions made by the local measuring network are as follows:

SO_2

Since 1995 the ambient air concentrations have not exceeded the maximum allowable concentrations (MAC).

Table 5. Average annual ambient air concentrations of SO_2 in μg /m^3.

Year	1968	1978	1994	1995	1996
Max. conc.	280	260	57	48	32

MAC = 50 μg SO_2 /m^3 per year

Black smoke

Since 1990 black smoke has been reduced due to widespread use of light fuel oil or gas instead of coal. Since 1993 the annual ambient air concentrations have not exceeded the MAC.

Table 6. Average annual ambient air concentrations of black smoke in μg /m^3.

Year	1978	1993	1994	1995	1996
Max. conc.	37	20	20	21	17

MAC = 50 μg of black smoke /m^3 per year

The concentration of nitrogen dioxide and carbon monoxide (data not shown) in the center of the city did not exceed the maximum guideline levels (MGL) in a few past years. However, the results of measurements of imission concentrations of suspended particles show that the problem of air pollution with particles in Celje remains unsolved.

It has been found out by the measurements of the amount of cadmium, lead, and zinc in suspended particles that the imission concentrations vary considerably (data not shown). The precise evaluation of the results will be possible after a longer, solid period of measuring (20, 21).

The measurements of the total air deposition have shown that the imission concentrations decreased significantly in industrial zone of the city, while in residential areas changes were not so significant. In some parts of the city MGL values are still exceed occasionally. This is not the case only in industrial zones, but also in densely populated areas in other parts of the city.

Cadmium, lead, and zinc in total deposits have shown that the imission concentrations did not decrease significantly in any part of the city since last two or three years when decrease of about 50% of former concentrations was observed at almost all measuring sites.

Conclusion

A clean environment is the basis for healthy and happy lives for people and other living beings. The community of Celje has only become aware of its importance to the environment when they have already inflicted serious damage on it and were afterwards paying a heavy price in order to remove consequences of environmental pollution in previous years.

The restoration of the environment is a complicated project that should include experts from the natural sciences as well as technical, economical, and political fields. The technological, economic, sociological, and psychological know-how are equally important.

The basis for successful work is the right information about pollution of a particular segment of the environment and regular monitoring of the effects of the measures taken.

Simultaneously with the measures to reduce pollution already inflicting damage on the environment, it is necessary to prevent further sources of pollution. The pollution of the environment has become a hindrance to further development. As a result, only energy-saving technologies should be used, which would enable us to use natural resources sensibly and reduce pollution. When planning and designing new buildings, they have to be carefully spaced and the communal infrastructure has to be expanded.

Willingness, expertise, good organization, creative co-operation of the parties involved and financial support are needed to find out the reasons for and to take measures against the consequences of pollution. If actions are taken in time, the ill effect of pollution on the environment can be prevented. Celje has the right conditions to act efficiently and thus reduce the present degree of pollution and prevent new mistakes.

Exercise

The main aim of the exercise is to get the students acquainted with the importance of environmental influences on health. They should understand that an intersectoral approach, which recognizes all facets of a community, helps in achieving better health for all.

Task 1:

Look at the Table 1. Name the diseases with the largest absolute burden attributable to environmental factors in developed countries and globally. Are there any differences? If yes, then explain reasons for differences.

Task 2:

Local authorities and their communities have assumed new responsibilities for global environmental problems. They were encouraged to join some already existing international programs and established their own projects to address these challenges. Try to develop a comprehensive LEHAP for the most important environmental problem in your local community.

Task 3:

Is air pollution an environmental problem in your local community? What are the main sources of air pollution? Explain the difference between hazard and risk of air pollution. List five solutions to reduce human exposure to polluted air.

After accomplishing this module students should be able to identify environmental factors that potentially affect human health and explain the relationship between risk and hazard. They should recognize the impact of environment on health and be able to list diseases with the largest environmental contribution worldwide and in developed countries as well. Finally, the significance of local community and importance of intersectoral approach in implementing measures to reduce environmental risks should be acknowledged.

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HEALTH PROMOTION AND DISEASE PREVENTION **A Handbook for Teachers, Researchers, Health Professionals and Decision Makers**	
Title	**Implementation of the Protocol on Water and Health in the Republic of Macedonia**
Module: 1.3.1	**ECTS: 1**
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Key words	Public health, Protocol on water and health, CEHAPE, drinking water, sanitation
Learning objectives	After completing this module students and public health professionals should: • develop their own case study that would illustrate the principles cited in this paper; • review the state of access to safe drinking water supply and related impact to children's health; • review the state of access to improved sanitation and related impact to children's health; • increase knowledge of the value of safe drinking water and sanitation, especially for children; and • recognize the importance of public health, especially preventative health programme with an ultimate goal of health promotion, improvement of access to safe drinking water and sanitation, and disease prevention activities especially in children.
Abstract	Childhood is a critical component of the health care life cycle. The objective of this Protocol is to promote at all appropriate levels, nationally as well as in transboundary and international contexts, the protection of human health and well-being, both individual and collective, within a framework of sustainable development, through improving water management, including the protection of water ecosystems, and through preventing, controlling and reducing water-related diseases. This is especially important for children as the most vulnerable group of population. Status of access to safe drinking water supply and improved sanitation in the Republic of Macedonia was reviewed, as well as the related health impacts.

Teaching methods	Teaching methods: *Lecture 1:* Health Promotion/Disease Prevention in Childhood – The Essence of Public Health. *Lecture 2:* Evidence-based data on the benefits of safe drinking water supply and improved sanitation in childhood. *Lecture 3:* Disease-specific recommendations for prevention and control of waterborne diseases. *Exercise 1:* The purpose of the exercise is to provide students with basic information about relevant literature as a solid basis for health impact assessment *Small group discussion:* The role of Protocol on Water and Health care in promoting quality of life in childhood. *Practicum:* Students should be able to prepare essays in accordance to Task 1-3. Each of the group will oppose or accept the findings of the others. *Exercise 2:* Students will identify status of access to safe drinking water in one city of their country and relevant health status of the local population, especially children.
Specific recommendations for teachers	*Question and answer session to follow each lecture.* A question and answer session will follow each lecture to help students clarify key aspects of each topic. *Lecture 1:* Provides an overview of how health promotion and disease prevention in childhood directly relate to the practices and principles of public health. Audiovisual equipment useful. Summary handouts to students in attendance based on this paper. *Lecture 2:* Focuses on the role of Protocol on Water and Health and CEHAPE in childhood and their impact on morbidity and mortality. Audiovisual equipment useful. Summary handouts to students in attendance based on this paper. *Lecture 3:* Summarizes selected disease specific recommendations to promote health and prevent waterborne diseases in children. Highlight evidence-based recommendations related to access to safe drinking water, improved sanitation and preventive health programmes. *Exercise #1:* Regarding waterborne diseases, students should identify lifestyle changes that affect disease onset and control. They should be able to correlate morbidity of waterborne diseases with safe/unsafe access to drinking water supply. They should recommend how to promote health status of targeted population. Exercise #2: Regarding waterborne diseases, students should identify lifestyle changes that affect disease onset and control. They should be able to correlate morbidity of waterborne diseases with improved/non-improved access to sanitation. They should recommend how to promote health status of targeted population.

	Small group discussion: Mandatory participation. Interactive session. It is expected that students will have read the reference material pertaining to this topic prior to the session. *Practicum:* Mandatory participation. Faculty will identify resources to present the importance of access to safe drinking water supply and improved sanitation. They will arrange for specific health professionals and civil engineers to work with students to achieve the programme goals.
Assessment of students	*Pre/Post tests in association with each lecture.* Each student will complete a ten question pre-lecture test. This test will be repeated after the lecture is completed. Each post-test represent 10% of a student's grade. *Small group discussion:* Mandatory participation. The small group discussion represents 20% of the student's grade. *Practicum:* Mandatory participation. Synthesizing the material presented in class, the assigned readings, and their practical experience, students will write a two-page paper describing how safe access to drinking water and improved sanitation relates to health promotion and disease prevention. The summary paper represents 50% of a student's grade.

IMPLEMENTATION OF THE PROTOCOL ON WATER AND HEALTH IN THE REPUBLIC OF MACEDONIA

Mihail Kochubovski

Introduction

The Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes is the first major international legal approach for the prevention, control and reduction of water-related diseases in Europe.

The Protocol was adopted in 1999 at the Third Ministerial Conference on Environment and Health, held in London, and entered into force in August 2005, becoming legally binding for the ratifying countries. So far, it has been signed by 36 countries in Europe and ratified by 21.

Signatories agreed to establish and maintain comprehensive national and/or local surveillance and early warning systems to prevent and respond to water-related diseases. They also agreed to promote international cooperation to establish joint or coordinated systems for surveillance and early warning systems, contingency plans, and responses to outbreaks and incidents of water-related diseases and significant threats of such outbreaks.

WHO/Europe and the United Nations Economic Commission for Europe (UNECE) provide the joint secretariat for the Protocol, coordinating activities for its implementation. WHO handles the health aspects, while UNECE takes care of the legal and procedural aspects (1).

In synthesis

By adopting the Protocol, the signatory countries agreed to take all appropriate measures to achieve:

- adequate supplies of wholesome drinking-water;
- adequate sanitation of a standard that sufficiently protects human health and the environment;
- effective protection of water resources used as sources of drinking-water, and their related water ecosystems, from pollution from other causes;
- adequate safeguards for human health against water-related diseases; and
- effective systems for monitoring and responding to outbreaks or incidents of water-related diseases.

Implementation

One representative from the Ministry of Health of the Republic of Macedonia has attended the UNECE-WHO *First meeting of the Parties to the Protocol on Water and Health***,** held in Geneva, Switzerland on 17-19 January 2007. This First meeting of the Parties to the Protocol on Water and Health has tackled the issues about the influence of water pollution to the health and the environment.

The Republic of Macedonia has not signed yet the Protocol on Water and Health, but nevertheless it has worked hard to implement the targets made during the Third Ministerial Conference on Environment and Health by the Protocol on Water and Health, held in London, June 1999. In the near future there is a hope that the Republic of Macedonia will succeed to overcome broader issues that were obstacles for signing and ratification of the Protocol on Water and Health. Over the past years the Republic of Macedonia has worked on the

NPAA (National Programme of Approximation) to the EU's legislation, and the outcomes gave status of a Candidate Country in 2005. It is strongly believed that negotiations should continue on the necessity of becoming a Party to the Protocol, but there is a need of some interministerial negotiation process between the Ministry of Health, Ministry of Environment and Physical Planning, Ministry of Agriculture Forestry and Water Economy and Ministry of Foreign Affairs. Until now, progress has been made but due to incomplete new legislation, poor economic status and some other issues, the Protocol has not been signed yet.

The objective of this Protocol is to promote at all appropriate levels, nationally as well as in transboundary and international contexts, the protection of human health and well-being, both individual and collective, within a framework of sustainable development, through improving water management, including the protection of water ecosystems, and through preventing, controlling and reducing water-related disease (2).

I. Current situation concerning the access to water supply and sanitation in Macedonia

1. Water quality and safe sanitation seen as a priority
   In the Republic of Macedonia drinking water quality has the highest priority. Concerning safe sanitation it is a top priority regarding the urban area, but the situation is different in the rural area, although there are some positive changes.

2. Challenges in relation to water and health
   At the national level, there are not particular challenges in relation to drinking water and health. But, there is a problem for example in Sveti Nikole, a small town of 12,000 inhabitants (in the Central-East part of the country) where high level of aluminium and trihalomethanes (THM) was found in treated water from Drinking Water Treatment Plant. The high content of aluminium and THM are due to the fact that the Water Treatment Plant is conditioning surface water from the local Dam (built for irrigation in 1970s). This is a small dam with only 2,000,000 m^3 water, and during the past three years the quality of raw water was very bad (high content of aluminium and natural organic matter in raw water). In 2003 drinking water from Water Treatment Plant was forbidden for use, and since then citizens drink water from water tanks filled-up with safe water from water supplying system in Shtip (neighboring city). A new Water Treatment Plant is being built but its construction is not finished yet (3).

3. Proportion of the population with continuous access to:
   - an improved water supply
     safe drinking - 93% (urban* 99% and rural** 78%) status in 2005
     with prediction of 95% in 2010
     unsafe drinking - 7%
     - rural 22%
     - *centralized piped water supply 33%[1] (297,417 inhabitants - 14%[2])*
       bacteriological improper samples - 2.3%
     - *local piped water supply 54% [1] (489,213 inhabitants - 23%[2])*
       bacteriological improper samples - 23%
     - *local water supply sources 13% [1] (117,000 inhabitants - 6%[2])*
       bacteriological improper samples - 30%

[1] *percentage from rural population (903,630 inhabitants)*
[2] *percentage from total population (2,103,630 inhabitants)*
* urban population 1,200,000
** rural population 903,630

29% of total populations that live in rural areas use drinking water from local piped water supply and local water supply sources. In these areas 26% of bacteriological improper samples have been registered. By approximation it could be estimated that about 239,303 inhabitants from rural areas (11% from the total population) are drinking potentially unsafe drinking water, because of lack of continuous chlorination which is a precondition for safe drinking water. Our Government has a goal to improve the access to safe drinking water by construction of new water supply systems and improvement of disinfection of drinking water.

- improved sanitation
  - urban 90% (in 2005) with prediction of 95% (in 2010)
  - rural 15% (in 2005) with prediction of 30% (in 2010)

4. Children affected by water-related diseases in the Republic of Macedonia
   The Children Environmental Health Action Plan for Europe (CEHAPE) is a document for policy makers addressing the environmental risk factors that most affect the health of European children. It was developed on request of the member states and adopted by european ministers at the Fourth Ministerial Conference on Environment and Health, held in Budapest in 2004, with the main topic "The future for our children".
   This action plan highlights the main commitments on children's health and environment and focuses on four regional priority goals (RPGs) for Europe:
   - RPG I: ensure safe water and adequate sanitation
   - RPG II: ensure protection from injuries and promote adequate physical activity
   - RPG III: ensure clean outdoor and indoor air
   - RPG IV: aim at chemical-free environments

   By addressing environmental risk factors, the CEHAPE covers two of the seven priorities within the comprehensive WHO European strategy on child and adolescent health and development.
   According to the CEHAPE the health status in the Republic of Macedonia referred to waterborne diseases is as following:
   - Bacillary dysentery: in 2005 = 8 cases in children /0-19 age/ compared to 5 cases in adults/20->60 (61.54% in children/0-19 age, compared to 38.46% in adults/20->60).
   - Enterocollitis: in 2005 = 4350 cases in children /0-19 age/ compared to 2501 cases in adults/20->60 (63.49% in children/0-19 age, compared to 36.51% in adults/20->60).
   - Hepatitis A: in 2005 = 535 cases in children /0-19 age/ compared to 171 cases in adults/20->60 (75.78% in children/0-19 age, compared to 24.22% in adults/20->60).

5. Steps taken to reduce the burden of water-related diseases among children
   There was a National Action Programme for Improvement of sanitary-hygienic situation in rural areas in the Republic of Macedonia in the period between 1971-1991. Principal research institution was the Republic Institute for Health Protection-Skopje, and the programme was financed by Water Economy Secretariat and Health Insurance Fund. During the implementation of this Action Programme the water supply networks in 850 villages have been built, as well as 25 sewerages.

In the period from 1991 to 2006 new water supply networks in 90 villages have been built.

In 1971 access to safe drinking water in the Republic of Macedonia was 64%, and after the implementation of the National Action Programme 1971-1991 and efforts from 1991-2003, access to safe drinking water in 2003 has been increased to 93% (4).

6. Progress has been made since 2004, on reducing the number of children suffering from water-related diseases

   There was a significant progress in reducing the number of children with bacillary dysentery:
   - (in 2004 = 14 cases in children /0-6 age/ compared to 2005 = 6 cases in children /0-6 age),
   - (in 2004 = 5 cases in children /7-14 age/ compared to 2005 = 1 case in children /7-14 age),

   There was decreasing in enterocollitis morbidity:
   - (in 2004 = 3519 cases in children /0-6 age/ compared to 2005 = 3147 cases in children /0-6 age),
   - (in 2004 = 1043 cases in children /7-14 age/ compared to 2005 = 820 cases in children /7-14 age).

   But there was increasing of prevalence in hepatitis A:
   - (in 2004 = 36 cases in children /0-6 age/ compared to 2005 = 283 cases in children /0-6 age),
   - (in 2004 = 70 cases in children /7-14 age/ compared to 2005 = 181 cases in children /7-14 age).

7. National programme to improve continuity and quality in water supply

   Now, the implementation of the improvement of the water supply is the responsibility of the Ministry of Environment and Physical Planning, Ministry of Agriculture, Forestry and Water Economy and Ministry of Transport. The role of the Ministry of Health, respectively Republic Institute for Health Protection-Skopje is to monitor the quality of drinking water from new sources, and the ten regional Institutes for Health Protection have the responsibilities to monitor water quality during the year according to the Preventive Health Programme (5).

   The Government of the Republic of Macedonia represented by the Ministry of Agriculture, Forestry and Water Economy in cooperation with the Ministry of Environment and Physical Planning, Ministry of Health, Ministry of Local Self-Government and other relevant stakeholders, supported by Japan Bank for International Cooperation (JBIC) and Japan International Cooperation Agency (JICA) are working on the improvement of water supply systems and irrigation in north-eastern part of Macedonia for seven municipalities - Kratovo, Probistip, Zletovo, Lozovo, Stip, Karbinci and Sveti Nikole, with total number of around 100,000 inhabitants. This process has started in 2005, but there were some previous investigations in 2001 as well.

   Special emphasis is put on children's health and drinking water quality.

8. Challenges and constraints

   There is a high level of political support, and high level of public awareness and readiness for voluntary labor, however financing of construction of new water supply networks, as well as maintenance of the already built ones is a big problem.

II. Water quality

9. National microbial failure rate of the water supply system (measured against E. coli)
   National microbial failure rate of the urban (1,200,000 population) water supply system is 0.8% because of the increased number of aerobic mesophilic bacteria. But, for rural areas (489,213 population) this is much higher, as 23% of samples have been improper because of microbial contamination, mostly as a result of lack of chlorination of drinking water. Only few percents are due to E. coli (6).

10. National chemical failure rate of the water supply system
    Urban water supply system in the Republic of Macedonia had 5.6% improper samples because of lack of residual chlorine, and higher values of manganese and iron (in Kocani and Stip). Since 2003 the local water supply system has been forbidden for usage in Sveti Nikole because of higher levels of aluminium and trihalomethanes in treated drinking water. In rural areas water supply system had 19% improper samples because of physico-chemical analyses mainly due to lack of residual chlorine, and showing only few high level of nitrate (some villages in Strumica), and 20% improper bacteriological samples because of higher content of coliform bacteria (6).

11. Laboratories carrying out the water quality assessment internationally accredited
    The Republic Institute for Health Protection-Skopje and its laboratories have been accredited for ISO 17025 (control of food quality - drinking water is a food according to the Food Safety Law in Macedonia (2002 and 2007). In addition, the ten regional Institutes for Health Protection are conducting the accreditation for ISO 17025 but only for the basic methods of food quality investigation.

III. Surveillance

The surveillance system is aimed at prevention and early alert, as well as outbreak detection and control/assessment of contagious diseases. There has already been established an ALERT System supported by the WHO in 2006.

12. Collection of data:
    - based on gender; and
    - based on age: 0-6, 7-14, 15-19 and 20-60>.

13. Standardized death rate in the below-5 population, per 100,000, of diarrheal diseases
    There was a decreasing trend in standardized death rate under five (1990 = 730/100,000; in 1997 = 390/100,000; and in 2002 = 265/100,000), of all causes.
    Standardized death rate under five population, per 100,000 of diarrheal diseases was 8.53 in 2002 (last available).
    Mortality (total) of under five population per 1,000 live born in 2003 was 11.3.
    In 2004 and 2005, there were no registered cases of deaths caused by diarrheal diseases in the Republic of Macedonia.

14. Incidence rate and case number of the following priority water-related diseases: cholera, enterohemorrhagic E. coli, hepatitis A, Shigellosis/bacillary dysentery, and typhoid

Overall:

- Bacillary dysentery: in 2004 = 20 cases in children/0-19 age/ compared to 9 cases in adults/20->60 (68.97% in children/0-19 age, compared to 31.03% in adults/20->60).
- Bacillary dysentery: in 2005 = 8 cases in children/0-19 age/ compared to 5 cases in adults/20->60 (61.54% in children/0-19 age, compared to 38.46% in adults/20->60).
- Enterocollitis: in 2004 = 5010 cases in children/0-19 age/ compared to 2832 cases in adults/20->60 (63.89% in children/0-19 age, compared to 36.11% in adults/20->60).
- Enterocollitis: in 2005 = 4350 cases in children/0-19 age/ compared to 2501 cases in adults/20->60 (63.49% in children/0-19 age, compared to 36.51% in adults/20->60).
- Hepatitis A: in 2004 = 144 cases in children/0-19 age/ compared to 76 cases in adults/20->60 (65.45% in children/0-19 age, compared to 34.55% in adults/20->60).
- Hepatitis A: in 2005 = 535 cases in children/0-19 age/ compared to 171 cases in adults/20->60 (75.78% in children/0-19 age, compared to 24.22% in adults/20->60).
- Cholera and typhoid were not registered.

15. Steps taken to reduce the endemic disease level, especially in children
    Several steps have been taken to reduce the endemic diseases level, especially in children, mainly by improvement of access to safe drinking water and sanitation, raising public awareness, health education and training, etc. National Environmental Health Action Plan from 1999 made priorities to improve access to safe drinking water and sanitation (7).

16. Steps taken to reduce the number and severity of outbreaks
    An alert system has been introduced since 2006 in order to reduce the number and severity of outbreaks, with the help of WHO. The Ministry of Health is working on improvement of the Health Information System.

IV. Education and awareness

17. Health education and awareness programmes on hygiene among public, parents, schools, communities included in professional training
    There are topics about public health, hygiene, drinking water quality and management as educational programmes in schools (Green Packet), High Schools and Medical Faculty (Chair of Hygiene is teaching subjects - Environmental Health, Food Safety and Nutrition) and training programmes (150 hours) about water quality management for unemployed and professionals.

18 Involvement of local authorities, NGOs, research and academic bodies, media, private industry, and other sectors in water-related disease prevention activities
    Local authorities, NGOs, research and academic bodies (medical), media, private industry food production by introducing Hazard Analysis Critical Control Point (HACCP), and other sectors are actively involved in water-related disease prevention activities.

19. Relevant national websites, publications or research
    The Republic Institute for Health Protection-Skopje has its own web site (www.rzzz.org.mk) which offers important information about prevention of water-related diseases, as well as drinking water quality etc. There are also relevant data about most important environmental health issues, especially regarding children's health. Most of the data are

in Macedonian language, but there are some important topics in English. There is a plan of improving the web site content.

V. Institutional set-up

20. Departments responsible for drinking water supply
Public Enterprises of Communal Hygiene in all cities are responsible for safe drinking water supply, as well as for some villages. They are under responsibility of the Ministry of Transport.

21. Departments responsible for drinking water quality
The Republic Institute for Health Protection-Skopje and the ten Regional Institutes for Health Protection (in Skopje, Kumanovo, Kocani, Shtip, Veles, Strumica, Bitola, Ohrid, Prilep and Tetovo) are responsible for monitoring of drinking-water quality. They report to the Food Directorate, a constituent segment of the Ministry of Health. Food Directorate was established and started to work in 2005.

22. Interdepartmental coordination body
Minister of Health has established a multidisciplinary coordination body - Commission for drinking, bottled and natural mineral water safety, and has nominated 6 experts (specialists of hygiene, biologist, chemist, technologist and lawyer). This Commission's task is to solve any problem of high priority related to drinking water quality at the national level.

VI. Survey of drinking water quality in the Republic of Macedonia

23. Drinking water quality in urban areas for the period 2001-2005
Data presented in Tab. 1 show slight improvement in the bacteriological quality of the investigated samples of drinking water in urban areas from 2001 to 2005.

Table 1. Drinking water quality in urban areas in Macedonia for the period 2001-2005

Period of monitoring	Physical-chemical %	Bacteriological %	Number of samples
2001	4.2	1.3	11534
2002	5.3	1.5	10681
2003	7.5	1	11932
2004	5.6	1	12136
2005	5.6	0.8	11946

24. Drinking water quality in rural areas for the period 2001-2005
From 2001 to 2005 there was registered small declination of the drinking water quality in rural areas (Tab. 2).

Table 2. Drinking water quality in rural areas in Macedonia for the period 2001-2005

Period of monitoring	Centralized piped water supply		Local piped water supply		Local water supply sources		Total		
	p-h %	bact. %	p-h %	bact. %	p-h %	Bact. %	p-h %	bact. %	No. of samples
2001	9.2	2.1	12	28	25	39	**15.4**	**23**	7428
2002	6.9	3.5	11.8	29	16.9	49	**11.8**	**27.1**	7238
2003	11	4.5	12.4	24.5	26.5	42	**15**	**24**	7953
2004	10	8	18	32	25	42	**17.5**	**27**	8594
2005	5.8	2.3	19.6	23	29	30	**19**	**20**	9028

25. Water quality of natural lakes for the period 2001-2005

Data in table 3 obviously show some improvement in the physical-chemical quality of surface water from natural lakes in Macedonia during the investigated period.

Table 3. Water quality of natural lakes in Macedonia for the period 2001-2005

Period / analyses	2001 class		2002 class		2003 class		2004 Class		2005 class	
	I-II	III-IV	I-II	III-IV	I-II	III-IV	I-II	III-IV	I-II	III-IV
physical-chemical	78%	22%	75%	25%	93.8%	6.2%	85.4%	14.6%	93.8%	6.2%
Bacteriological	98%	2%	97%	3%	96.4%	3.6%	88%	12%	96.4%	3.6%
No. of samples	216		218		195		178		195	

There are three natural lakes in the Republic of Macedonia: Ohrid, Prespa and Dojran. They are transboundary international lakes. Ohrid Lake usually belongs to the first, and Prespa Lake to the second class. Dojran Lake, because of natural enrichment concerning physical-chemical analyses, belongs to III-IV class (iron, manganese, iodine etc.). Monitoring of the bathing water quality is made by the Republic Institute for Health Protection and three regional Institutes for Health Protection (Ohrid, Bitola nad Veles).

In the case of improper results the above mentioned institutes inform the State Sanitary and Health Inspectorate, section of the Ministry of Health. State Sanitary and Health Inspectorate proclaim this potentially polluted surface water, and forbid its use for bathing, which is followed by information given to public by public media.

VII. Approximation status of drinking water quality, natural mineral water quality and bathing water quality in the Republic of Macedonia

26. Approximation in drinking water quality

The Republic of Macedonia as an accession country to European Union in 2004 had a goal to harmonize its national legislation related to the environmental protection. One of the achieved goals was a preparation of a new Book of Rules for Drinking Water Safety. The process has started with the translation of the Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for community action in the field of water policy, and Council Directive 98/83/EC on the quality of water intended for human consumption. A lot of work on preparation of the new Law on Waters was done during 2002-2003. There were three drafts prepared by the working group, that

consisted of nominated experts from the Ministry of Agriculture, Forestry and Water Economy, Ministry of Environment and Physical Planning and Ministry of Health, and in December 2003 was completed the Final version of the new Law on Waters. This process has been supported by the European Union and managed by the European Agency for Reconstruction. In autumn 2003 the Republic Institute for Health Protection-Skopje has started a preparation of the new Book of Rules for Drinking Water Safety, according to the nomination done by the Ministry of Health. The first Draft has been sent by the Ministry of Health to the other respective ministries, institutions and associations (of Specialists in hygiene and environmental health, microbiologists, chemists, etc.) in order to have an expert opinion and remarks. After collecting of all replies, the First Draft was revised and all other necessary issues were included in order to have a Book of Rules that would be applicable and recognized in practice by all stakeholders in the field of drinking water management. The Final Version was sent to the Ministry of Health on 26th December 2003. The new Book of Rules is not valid for natural mineral waters in accordance with the Council Directive 80/777/EEC, and waters which are medicinal products according to the Council Directive 65/65/EEC. WHO recommendations (Guidelines for drinking water quality, 2nd edition; Copenhagen; 1996) were also included in the new Book of Rules, as well the local circumstances and priorities. This was only one step in the process of the approximation and harmonization of the national legislation with the European Union's one, in order to have sustainable development in the field of protection of water sources, treatment and disinfection of water, as well as monitoring of the drinking water quality in order to protect human health. Public information and communication is a part of this sub-law, in accordance with the EU Directive 98/83/EC and Convention on access to information, public participation in decision making and access to justice for questions related to the environment, set-up at the Fourth Ministerial Conference "Environment for Europe" in Aarhus, 1998. The new Book of Rules for Drinking Water Safety was proscribed in the Official Gazette of the Republic of Macedonia No.57/2004 and it is a powerful tool for protection of human health. However new WHO recommendations (Guidelines for drinking water quality, 3rd edition; Geneva 2004) were published and there is a need for amending this Book of Rules and it is planned to be done in 2007 (8).

27. Approximation in natural mineral water quality

The Republic of Macedonia as a Candidate Country to European Union has a goal to harmonize its national legislation related to the environmental protection. One of the achieved goals was a preparation of a new Book of Rules for Natural Mineral Water Safety. The process has started with the translation of the Council Directive 80/777/EEC, 96/70/EEC and 2003/40/EC of the European Parliament and of the Council for natural mineral water quality intended for human consumption. The new Book of Rules was proscribed according to article 8, paragraph 1 of the Law for food safety and products and materials that are in contact with food ("Official Gazette of the Republic of Macedonia" No.54/2002). In spring 2004, the Republic Institute for Health Protection-Skopje started a preparation of the new Book of Rules, given the nomination by the Ministry of Health. The first Draft was sent to the members of the Committee for Natural Mineral Water, as well to different institutions and associations (of Specialists in hygiene and environmental health, microbiologists, chemists, etc.) in order to have an expert opinion and remarks. After collecting of all replies, the First Draft was revised and all other necessary issues

were included in order to have a Book of Rules that would be applicable and recognized in practice by all stakeholders in the field of natural mineral water management. The new Book of Rules applies to natural mineral waters in accordance with the Council Directive 80/777/EEC, 96/70/EEC and 2003/40/EC, but does not apply to waters which are medicinal products according to the Council Directive 65/65/EEC. WHO Guidelines for drinking water quality, 2nd edition; Copenhagen; 1996, and 3rd Edition; Geneva 2004, Codex Alimentarius Commission - Codex standards for natural mineral waters, Vol.XIII; Second Edition, Vol.XIII/1994, Methods of analysis and sampling; Codex standards for natural mineral waters, Vol.XII/1982 and Revision 1-11/1997; and Vol. XII/2001; General standard for bottled/packaged drinking waters (others than natural mineral waters, 227-2001); as well the local circumstances and priorities have been taken into consideration. This was only one step in the process of the approximation and harmonization of the national legislation with the European Union's one, in order to have sustainable development in the field of protection of sources and treatment of natural mineral water, as well as monitoring, in order to protect human health. Public information and communication is a part of this sub-law, in accordance with the EU Directives 96/70/EEC, 2003/40/EEC and Convention on access to information, public participation in decision making and access to justice for questions related to the environment, Aarhus, 1998. The new Book of Rules for special requirements for natural mineral water safety was proscribed in "Official Gazette of the Republic of Macedonia" No.32/2006 and is a powerful tool for protection of consumers' rights and human health (9).

28. Approximation in bathing water quality

Within the activities of NPAA for the period 2007-2008, it is planned a new Book of Rules for Bathing Water Quality harmonized with the Directive 2006/7 of the European Parliament and of the Council concerning the management of bathing water quality and WHO (10).

Ministry of Health is responsible for preparation and proscribing of this new Book of Rules in cooperation with the Ministry of Environment and Physical Planning.

The scope of this new Book of Rules should be:

- monitoring and classification of bathing water quality;
- management with the bathing water quality;
- public information concerning the bathing water quality.

The aim of this new Book of Rules will be to protect and promote environmental quality and to protect human health by complementing/upgrading the Directive 2000/60/EC.

This new Book of Rules shall cover surface water quality which huge number of people will use for bathing. Establishment of permanent prohibition for bathing, or permanent advice against bathing issuing will be done by responsible authorities.

Conclusion

Children Environmental Health Action Plan for Europe (CEHAPE) is a document for policy makers addressing the environmental risk factors that mostly affect the health of european children. It was developed on request of member states and adopted by european ministers at the Fourth Ministerial Conference on Environment and Health (2004) on "The future for our children". This action plan highlights the main commitments on children's health and environment and focuses on four regional priority goals (RPGs) for Europe. The

first regional priority goal is to ensure safe water and adequate sanitation. Within this context and the Protocol on Water and Health, Ministry of Health of the Republic of Macedonia its own drinking water quality and children's health has been evaluated in order to be able to improve the quality of life of the most vulnerable part of the population.

Student Assignment

Based on this case study concerning the drinking water quality and children's health, develop your own case study that would illustrate the principles cited in this paper.

Exercise: Systematic literature review

The purpose of the exercise is to provide students with basic information about relevant literature as a solid basis for health impact assessment.

Students should be able to prepare essays in accordance with Task 1-3. Each of the group will oppose or accept the findings of the others.

Task 1: *Determine the scope of the literature review*

Scope
- Inclusion criteria
- Exclusion criteria

Types of literature
- Inclusion criteria
- Exclusion criteria (such as excluding newspaper articles or non-peer reviewed material)

Task 2: *Determine the sources of relevant literature*

Primary sources (such as original peer-reviewed articles)

Secondary and tertiary sources, such as review articles, reports, citations in journal articles, books, literature directories, Internet databases, newspapers, personal communications and unpublished data

Task 3: *Review and evaluate literature*

Develop evaluation criteria

Evaluate each paper in relation to
- Methods used
- Relevance to local area
- Validity of findings

References

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4. Republic Institute for Health Protection-Skopje. National Action Programme for Improvement of sanitary-hygienic situation in rural areas in the Republic of Macedonia since 1971-1991.
5. Ministry of Health of Macedonia. Preventive Health Programme in the Republic of Macedonia, 2004.
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10. M. Kochubovski. Use of membrane filtration for water treatment with examples from the Republic of Macedonia. Proceedings from NATO/ARW "Nanotechnology - Technological Issues and Environmental Safety", Publisher: Springer, Dordrecht; 2007: 193-205.

Recommended readings

1. UNECE. Protocol on Water and Health. Available from: http://www.unece.org/env/water/welcome.html
2. United Nations. Millennium Development Goals (MDGs). Available from: http://www.euro.who.int/watsan/issues/20050518_1.
3. Children's Environment and Health Action Plan for Europe (CEHAPE). Available from: http://www.euro.who.int/childhealthenv/Policy/20020724_2.