

UDK 343.98

ISSN 0354-8872

ACADEMY OF CRIMINALISTIC AND POLICE STUDIES, BELGRADE – THE REPUBLIC OF SERBIA
KRIMINALISTIČKO-POLICIJSKA AKADEMIJA – REPUBLIKA SRBIJA

NBP

JOURNAL OF CRIMINALISTICS AND LAW

ŽURNAL ZA KRIMINALISTIKU I PRAVO

KRIMINALISTIČKO-POLICIJSKA AKADEMIJA
Beograd, 2009.

PUBLISHER

Academy of Criminalistic and Police Studies, Belgrade, 196 Cara Dušana Street, Zemun

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300 copies

PDF VERSION OF THE JOURNAL

www.kpa.edu.rs

Published three times a year.

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ENDANGERMENT OF SECURITY AS A CONSEQUENCE OF GLOBAL WARMING

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Abstract: The ecological issues, primarily the viable development, protection and preservation of living and working environment, have become unavoidable, i. e. dominant issues at the world scene. Warnings are coming from everywhere. Ecological risks are global, long-lasting with incalculable consequences and irrecoverable damage. Ecological problems know no local interests and boundaries. Accordingly, the fight against ecological problems requires common, united and synchronized action.

The problem of climate changes has gathered the representatives of the international community in the search for the appropriate solution. The changes happening in the nature, particularly those that represent the consequence of the emission of gases which create the greenhouse effect, require the involvement of the countries at the international level considering that these gases spread over the entire atmosphere, as well as due to the fact that the gas emission control is very expensive and therefore the common action at the international level is far more economical.

Key words: trend of global warming, safety, environment, global ecological problems.

1. Introduction

Destruction and endangerment of the environment may have serious consequences to human health, poverty, economic crisis and security in the widest sense. Is it possible to maintain safety when there are global prob-

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lems influencing all human activities? Global warming is a rather “popular” ecological phenomenon that lasts from the end of 1980s, when the first prognoses of future temperature increase emerged.

Ecological crisis is a part of great civilisation chain of events, first of all, deep crisis of one way of production, consumption model and economic growth. This way of life has brought man out of the balance with nature, and this balance can be restored only by thorough socio-cultural alternatives related to ways of production and consumption. Times we are living in are challenging regarding environment. Events that occur fast require proper level of engagement – if we cannot prevent them, then at least we can participate in the contemporary world and the European processes in the field of environmental protection and management.

Risks increasingly gain global character. Number of risks continuously grows the same as the number of potentially endangered people, material resources, and the territories of possible ecological misbalance. (Miltojević, 2005).

The end of XX and the beginning of XXI century are characterized by the accelerated process of globalization that leads to numerous positive, but also negative consequences – risks related to the environment, thus it came to emergence of policy of global responsibility, common norms and opinions on what to do in order to maintain ecological security. Achievement of this security requires the existence of socio-ecological security, that is, its achieving is related to economic, social, health, technological, chemical and other types of security. Ecological security implies that kind of state in transnational relations that ensures maintenance, rational use, reproduction and increase in quality of the environment, in order to maintain sustainable and secure development of all countries and create favourable life conditions for every man. Ecological security implies implementation of the system of normative, organizational, agricultural and production measures, adopted within the international cooperation and based on the international law.

2. Global Climate Changes and Greenhouse Effect

Climate changes are general ecological problem, for they represent serious threat to the natural environment. Climate changes are based on the so-called “greenhouse effect”. Greenhouse effect can be described as a change in the atmosphere due to the activity of gases that are “radioactively active” and yet essential for life. These gases trap the heat in lower layers of the atmosphere and thus create a much warmer environment than it would be otherwise.

Although we still do not know for sure the extent to which greenhouse gases cause the warming effect, gases that mostly contribute to climate changes have been identified. Today, climate changes, global warming, ozone hole and acid rains represent world political problems. Although they are interconnected, there are four different problems. Their mutual characteristic is the fact that they cause problems of global proportions. In the last 30 years, human activities have reached the critical level, and their consequences gain global dimension. Since these problems are global, all world nations have to participate in its solving.

Greenhouse effect is a natural process that keeps the Earth warm enough to make life on it possible. From the total solar energy, only 50% reaches the surface of the Earth and warms up land and oceans. One part of radiation is reflected back to space, and the other is absorbed by the atmosphere. The Earth absorbs energy and reflects 30% of it as infrared radiation. Gases in the atmosphere absorb one part of that energy, by transforming it into kinetic energy and potential energy of molecules and thus heating up the atmosphere. Gas molecules radiate energy in all directions, including downward to the Earth. This process when the gases in the atmosphere transform infrared radiation into thermal energy warms up the planet. Every change in radiation, whether it is in the process of absorbing or emitting into the space, influences the climate. The surface of the Earth absorbs nearly twice more energy from the atmosphere than from the Sun. The Sun is far stronger source of energy, but it does not heat the Earth evenly, while the atmosphere warms up the sky evenly (Barde 1991).

Escalation of global ecological crisis, manifested in climate changes, warming, depletion of ozone layer, acid rains and spreading of deserts, represents a result of deterioration of ecological situation in various countries and regions, where pollution is the most intense. Key directions of serious changes must comprise the use of alternative and renewable energy sources, ecologically harmless technologies without polluting atmosphere and hydrosphere, as well as activities directed towards preservation of drinking water resources. Success in realization of sustainable development strategy depends greatly upon understanding mutual dependence between ecodynamics and socio-economic development.

The most serious consequence of pollution, that went previously unnoticed, is the impact of cumulative and long-term effects of chemical substances, especially organic, on human health and all other living creatures. According to the definition adopted by the OUN, „pollution is exogenous chemical substances in inappropriate place, at inappropriate time and in inappropriate amounts“. The analysis of present situation shows that signifi-

cance and „specific weight“ of some ecological problems vary in different regions of the world.

Lately everybody talks about the influence climate has on socio-economic structure of a region or country. This thought was first created by Robert White, the president of the First World Climate Conference held in 1979, organized by the World Meteorological Organization. Since then, the United Nations Environment Programme is dealing with climate research issues. At that time, the decision was made to realize the World Climate Programme and strategies of ecological, political and economic actions (UNEP, 1997). The basic goal of this Programme was to establish political instruments that would enable a country to decrease dependence of its socio-economic systems on climate and its change, whether they were natural or anthropogenic. One of the Programme's tasks is the creation of coordinated system of national and regional response strategies to climate changes.

The concentration of carbon dioxide, methane and nitrous oxides in the atmosphere has doubled compared to the period before industrialization. In case this tendency continues, calculations show that until 2010 the temperature on planet Earth will increase in 1-3°C, which could cause the increase of level of world oceans (according to different estimations from 0,3 to 1 m). Besides, one year increase of concentration of carbon dioxide is 0.5 %, methane 0.9 %, nitrous oxides 0.25 %, hydro-fluorocarbons 4 %. Tendency of increase in concentration of small gases was intense during XX century. Comparisons were possible due to analysis of paleo-temperatures. The basis for their determination is the analyses of relations of stable isotopes in ice. The analysis of Antarctic ice samples enabled the determination of characteristic tendency of increase (Britton, 2002).

The most relevant study on this issue was announced after the Intergovernmental Panel on Climate Changes (IPCC), held in 2001 within the United Nations, which predicts that the temperature on the surface of the Earth could increase 1.4°C to 5.8 °C. This study predicts that this increase in temperature could cause melting of glaciers and polar arctic ice, increase of sea level, emerging of storms, destabilization and disappearance of animal habitats, animal migrations to the North, salinization of shallow waters, massive forest devastations, accelerated disappearance of plant species and great droughts.

Greenhouse effect implies the detention of vast part of energy from the Sun on the surface of the Earth. During the 1970s, it was proved that other gases, in much smaller concentrations than carbon dioxide, cause the greenhouse effect. During the 1970s and 1980s, numeric experiments were conducted that showed that in case the concentration of carbon dioxide doubled,

global warming could be 2-4 °C, and in polar areas of the northern hemisphere 6-8 °C. Main source of carbon dioxide and nitrous oxide is the combustion of fossil fuels. Methane is a by-product of agricultural production (livestock farming, rice production). Halogen hydrocarbons are of solely techno-gene origin. Three countries with the highest levels of carbon dioxide emission are the USA, China and Russia. Several scenarios were elaborated, related to development of energetics, emission of gases in the atmosphere and its consequences on a global scale. The most supported is the concept of global warming due to greenhouse effect. This concept consists of the following:

1) The emission of greenhouse gases in the atmosphere increases continuously. The sources of carbon dioxide are combustion of coal, petroleum, gas and their derivatives (above all petrol) in thermo-electric power plants, car engines, stoves, etc. The emission of carbon dioxide has increased in the last 40 years, especially in industrial countries. The emission of other gases that enhance the greenhouse effect increases much faster – methane, nitrous oxide, and halogen hydrocarbons.

2) Due to the emission of gases in the atmosphere, the average year temperature on the Earth has increased and is still increasing. According to some estimation, in the last decade of XIX century the average annual temperature was 14.5 °C, and in 1990s it exceeded 15.2 °C. According to the predictions, in the period from 2030 to 2050, the average annual temperature on the Earth could increase 1.5-4.5 °C compared to the present, thus achieving the highest level for the past two million years.

3) The consequences of warming to population and economy of different countries may vary – they can be both positive and negative. At global scale, the expected fast climate changes may cause difficulties. Sea and ocean levels might rise for 0.5-1 m by the middle of XXI century, and for 2m by the end of the century, which might cause vast territories to be flooded. According to the data provided by the Intergovernmental Panel on Climate Change, by the year 2100 an average sea level might increase for 15cm to 95cm (probably about 50cm). The number of disasters with catastrophic consequences will increase, too. Biodiversity might drop rapidly, as well as forest regions, and irreversible degradation of ecosystem will start. (Kotler, 2005).

Today, human activities lead to sudden and uncontrolled growth of concentration of gases which participate in the “greenhouse effect”, and because of that the atmosphere is heating and its ability to cool down is decreasing, which results in temperature growth in lower layers of the atmosphere and on the surface of the Earth.

Besides carbon dioxide, which contributes 76% in the “greenhouse effect”, methane also contributes 13% in this phenomenon, hydro-fluorocarbons about 5% and nitrous oxides 6%. All the gases that are leading to “greenhouse effect” can survive in the atmosphere for a long period of time, which would make their concentrations more difficult to decrease:

- Carbon dioxide 50-200 years,
- Methane 10.5 years,
- Hydro-fluorocarbons 2-550 years,
- Nitrous dioxide 132 years (UN 1999).

Global consequences of climate change are:

–The increase of average global temperature of the Earth’s surface: average air temperature in lower layer has increased between 0.3 and 0.6 °C till the end of XX century (1998 was the warmest year according to the European Environment Agency data (EEA).

–The increase of sea level: global warming causes melting of glaciers and sea ice and oceans warming, and this causes their spreading. All these factors contribute to the increase of sea level – according to the Intergovernmental Panel on Climate Change (IPCC) in the last 100 years sea level has increased for 10 cm-25 cm, which leads to floods and changes of water surfaces and lowlands, increases salinity of estuaries and inflicts damage to drinking water sources and potential human habitats.

–Changes in precipitation (level of precipitation has increased in the North Europe and decreased in the South Europe)

–Changes in hydrological and water sources regime: mountains can lose the substantial part of their ice component, which may lead to withdrawal of ice line. The consequences of these changes to water drainage and river flow would probably manifest in more frequent and stronger floods, poor quality of water due to income of salty water and slow water flow.

The impact on ecosystems, agriculture and forestry: the increase of temperature would lead to shifting of climate zones towards the North, which could happen much faster than some species could migrate, especially wild flora. As regards to agriculture and forestry, prolonged duration of seasons and decreased productivity is possible (Davis, 1998).

The way in which the global warming will lead to the increased frequency of storms and other natural disasters is still in research. Some experts believe that if the level of sea increases for 1 m, hurricanes would be considerably more devastating and more frequent. The intensity of hurricanes depends on sea temperature and if temperature of sea rises, the strongest hurricanes would have 40-50% more power, which could lead to the increase in number of the dead and injured.

With the increase of global temperature the growth of precipitation is expected. Warmer air is leading to larger sea evaporation, which causes increased cloudiness. Rain and snow fall will rise for 5-7%. According to some expectations, based on mathematical models, precipitation will increase up to 20% during winter. It is predicted that the increase in precipitation will not be even.

The changes in normal cycle of atmospheric waters will probably result in dry periods in what we today know as the most fertile parts of the world, which will reflect on the production of food. In the USA Midwest region, which provides 90% of the global grain production, drought periods are expected to decrease crop. Temperature growth of 2°C can decrease crops in Europe and the USA for 2-17%. In the last ten years the production of agricultural products has significantly dropped because of draughts.

In the developing countries, alternating emergence of draughts and floods will influence the decrease in already small crops, so the shortage of food and inadequate diet of population with following consequences to the health will remain a problem in these areas. As the number of people who are insufficiently and inadequately feeding is growing even without the climate change, it can only contribute to endangering larger parts of world population. Global warming is affecting survival, location and contents of ecosystems. Biodiversity is constantly decreasing throughout the world. One of the largest global problems is the increase in the rate of disappearance of animal and plant species compared to the average rate of appearance in previous millennia. The disappearance of species includes the decrease of genetic diversity, which will result in changes of ecosystems. This phenomenon is named the loss of biodiversity. The causes of this phenomenon are secondary consequences of socio-economic activities (population growth, need for food, more intense use of the land, increase in consumption and degradation of resources). Biological diversity is influenced by the structure and behaviour of domestic and international markets and government policies that direct decisions on resources exploitation at local level. The loss of biological resources which derives from their unsustainable exploitation, may cause degradation of land and lead to increase of poverty, especially in rural areas, although areas should not be divided into rural and urban. Development of society ousts untouched wild regions, and animals that live there will not be able to keep up with changes in ecosystem. When they lose their natural habitat, they will have nowhere to go. Some animal species (such as caribou in the Arctic) will lose migration paths while ice that connects islands melts. The loss of species is very important to humans, because in that way we lose various resources, such as food, products, medicaments,

etc. Under the influence of changed climate, some species become dangerous to human health. (Gherardi, 2008).

All these predictions are based on scientific theories and observations.

3. Measures to Prevent Emission of Greenhouse Gases

The most common polluting substances are carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), microparticles of soot. Specific air polluting substances are also lead, cadmium, manganese, arsenic, nickel, chromium, zinc and other heavy metals and organic compounds that emerge as a result of different activities.

Carbon monoxide (CO) is a very toxic, colourless, odourless and tasteless gas. This gas is produced from the partial combustion of fossil fuels. Concentration of 1% of CO in the air is lethal. Carbon monoxide is toxic in high doses and indirectly contributes to global warming as a precursor of ozone. Emission of carbon monoxide derives mainly from the traffic. Europe emits around 125 M tons, or 11% of the total world emission.

It is estimated that Europe emits 39 M-tons of sulphur dioxide (SO₂) a year. Emission of SO₂ is drastically higher in winter than in summer period, due to the combustion of fossil fuels. Winter smog occurs mostly in central, south and southeast Europe. Because of that, the authorities in these countries started a campaign for the reduction of car use in central town areas. The concentration of SO₂ in the atmosphere of the western European towns has noticeably dropped compared to 1970. The drop of SO₂ concentration in the atmosphere is a result of reduction of fossil fuels use for household heating.

Emitted acid substances such as SO₂ and nitrogen dioxide (NO₂) may stay in the atmosphere for a couple of days and cross distances up to several thousands kilometres, where they convert to sulphur and nitrogen acid. Primary pollutants SO₂ and NO₂ and their reaction product, after deposition and change fall onto the surface of the Earth and into waters (acid rains), where they cause environment acidification. The effects of acidification reflect on water organisms sensitive to increased pH and toxic metals in the water, plants are sensitive to increased concentration of hydrogen ions in soil, people suffer consequences of consuming water that has inadequate pH and increased concentration of metals. Measures to mitigate the consequences of negative effects of these gases are:

- Switching to lower-carbon fuels, such as natural gas;
- Increasing efficiency in use of energy in industry and traffic by adopting ecological agreements;

- Use of renewable energy sources, such as solar, hydropower, wind and biomass energy,
- Better waste management, composting, recycling,
- Decrease of CH₄ emission from coalmines by using best possible technologies. (Bormann, 2000).

4. The Activities of the International Community in the Prevention of Global Warming

World public gives special attention to climate changes. The 1990s were the period of turbulent development of awareness of these changes and reacting to them. An important step in the world ecological policy was the adoption of the United Nations Framework Convention on Climate Change at the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. This Convention was signed by 154 countries. In accordance with the Convention on Climate Change, by the year 2000 the emission of gases was supposed to decrease to the level it had in 1990, (carbon dioxide 60 %, and methane 23 %). The main pollutants were the USA (22 %) and the USSR (19 %). At the first Climate Conference, held in Berlin in 1995, the participants admitted that these commitments were insufficient. In 1997, at the second Climate Conference, held in Kyoto, it was decided to change them. However, up until the third Global Climate Conference, held in Buenos Aires in 1998, this issue was not fully solved. The USA planned until 2008 to decrease emission of gases to the level of 1990. However, the emission of gases is still increasing. In 1996, the emission of gases increased for 13 % in Canada, and 8,3 % in Japan. The countries of the South Asia demanded the decrease of the emission of 20% until 2005 compared to 1990. At the centre of attention remains the uneven emission of gases of different countries. In 1998, the emission of carbon dioxide per citizen was 5.4 t in the USA, 2.5 t in Great Britain, 1 t in Argentina and 0.3 t in India.

One of the new approaches in solving this problem is the introduction of system of “market” relations. The protocol of the II Climate Conference, held in Kyoto in 1997, predicted the following steps: realization of joint projects of carbon dioxide emissions trading between the countries, credit trading and “clean” development (UNEP, 2003).

The first United Nations Conference on the Human Environment was held in Stockholm in 1972, and it represented the turning-point in human relation towards environment. The Stockholm Declaration was adopted which pointed to alarming condition of environment quality and necessity of monitoring its quality, spending of resources, pollution consequences on

human health, nature, flora and fauna. 5th June, as the first day of the Stockholm Conference, was proclaimed as World Environment Day. In the period 1972-1990, a large number of theories and environment protection movements emerged, that did not go beyond the Stockholm Declaration. Let us list some of them: theory of organic growth, theory of world order transformation, theory of stable state, theory of post-industrial era, theory of social system decentralization. In the year 1987, the World Commission on Environment and Development has presented to the public a report named "Our Common Future" based on intergenerational and intragenerational that meets the demands and provides good life conditions in developing countries. The Report was based on new concept of world economic and ecological policy, and one of its most important results was the adoption of "Business Charter on Sustainable Development" that gives instructions to industrial enterprises on basic components of ecological management. In 1992, a conference was held in Rio de Janeiro, and for the first time it was pointed to the connection between development and environmental protection. It is also important to mention action programme "Agenda 21" that gives proposals for environmental protection and development policy, as well as the "European Community Council Regulation" No. 1836/93 on voluntary participation of industrial enterprises in the European Community system for the Control and management of the environment (Bogdanović 2008).

The first Conference of Parties was held in Berlin in 1995 and the second one in Geneva in 1996. The parties, among other things, accepted:

- Preparation, innovation, publishing and delivery of national reports of anthropogenic emission of gases, whose control is not affected by the Montreal Protocol, using comparative and harmonized methods during the process, and
- Formulation, realisation, publishing and periodical correction of national and, if necessary, regional programmes of measures for preventing climate changes by controlling anthropogenic sources of greenhouse gases emission, whose control is not affected by the Montreal Protocol, as well as measures that help adaptation to climate changes.

The Third Conference of the Parties was held in Kyoto (Japan). 159 countries took place in it. Protocol signed in Kyoto represents an important event in the world ecological policy. The Protocol formulates the task of decreasing emission of greenhouse gases in the developed countries (39 countries were mentioned). Many countries like Russia, Ukraine, Australia and New Zealand can maintain their emission on previous level, while Island and Norway can even increase them (for 1.5 - 10 %). Questions asked by the Kyoto Protocol are still in active consideration. At the fourth Conference of

the Parties, held in Buenos Aires in 1998, the control period from 2008-2012 was established. On the meetings of G-8 group in Gothenburg and Genoa in 2001, the main subject was the decrease of emission of greenhouse gases.

In December 2009, organized by the UN, the delegations of 192 countries held two-week long negotiations in Copenhagen in order to establish and reach a new global agreement on climate changes.

The final document was coordinated by 27 countries, among which were the USA, China, India, Brazil, the South African Republic and the leading EU countries, while the other participating countries agreed to submit reports on whether they would join the Declaration.

The Copenhagen Agreement, as a result of the conference is not legally binding; it does not contain concrete figures related to the obligations of the countries to decrease the emission of harmful gases or the goal to decrease the emission of carbon dioxide for 50% by 2050.

This document provides for the countries to determine themselves and state their national goals related to the emission of harmful gases during January 2010.

Whether the Copenhagen Conference will make a step forward towards the achievement of ideas and thoughts to decrease the emission of harmful gases or it will be interpreted as an excuse for political interests remain a question which holds hope of the positive answer (UN, 2009).

5. Conclusion

Based on all the above mentioned, we can conclude that safety endangerment is the cause of global ecological problems (global warming, climate changes, acid rains, depletion of ozone layer, transportation of radioactive, bacteriological and toxic materials), as well as many other problems (degradation of land and forests, decrease in crops, increase in cancerous, viral and other diseases, melting of glaciers and decrease in drinking water supplies, etc.).

The main problem which remains is the decrease of the greenhouse gases emission. This problem is in the focus of attention of the climate changes research. It is the result of the fact that some gases, such as CO₂, water evaporation, CH₄, N₂O, O₃, CFC, SF₆ and aerosols absorb long wave radiation from the Earth's surface. As it is known, the concentration of carbon dioxide, methane and nitrogen oxide in the atmosphere doubled in comparison with the period before industrialization. Solar warming of the soil causes that it starts behaving as a source of infrared heat radiation. Only a small quantity of this radiation goes into space and the largest part is ab-

sorbed by greenhouse gases in the atmosphere. These gases reemit this radiation and up to 90% returns to the Earth again where it is again absorbed and the process lasts until there is a long wave radiation. During the last 160.000 years the conditions on Earth have been changing. Ice and warm periods have been following each other. The global temperature on Earth is increasing and in the last 100 years it has increased for 0.4 – 0.6 °C.

The analysis of ecological risk is an integral element of ecological decision-making process. The decision-makers must first identify the ecological risks and evaluate the possibility of negative influences on the living environment, which would enable to choose the most suitable direction of the risk reducing actions. Realistically, not all ecological risks can be eliminated and it is therefore important for the ecological decision-makers to determine the level of the risk that a society could tolerate. Necessary and required condition of risk prevention is the acceptable level of risk and its determining.

Conclusion of this paper is that the biggest responsibility lies on the most developed countries which are, at the same time, the biggest pollutants and have to undertake maximum efforts to decrease the amount of gases.

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UGROŽAVANJE BEZBEDNOSTI KAO POSLEDICA GLOBALNOG
ZAGREVANJA

Rezime

Klimatske promene imaju najviše negativnih uticaja na zdravlje ljudi. Ako trend zagrevanja ostane bez kontrole, čovečanstvo će se suočiti s većim povredama, bolestima i smrtnim slučajevima kao posledicama prirodnih katastrofa i toplotnih talasa, većom učestalošću zaraznih oboljenja koja se prenose hranom, vodom i vektorima, kao i većim brojem prevremenih smrti i bolesti kao posledicom zagađenja vazduha. Nauka je jasna: zemlja se zagreva, zagrevanje se ubrzava, a odgovornost je na čoveku i njegovim aktivnostima. Čista voda i dobri higijenski uslovi, sigurna i pravilno odabrana hrana, imunizacija, nadzor nad bolestima i pravovremeni odgovor, sigurna i efikasna kontrola prenosilaca bolesti i spremnost za katastrofe predstavljaju ključne komponente prakse javnog zdravlja koje treba jačati globalno u skladu s klimatskim promenama. Donosioci odluka na svim nivoima moraju biti svesni činjenice da odluke koje utiču na urbano planiranje, transport, snabdevanje energijom, proizvodnju hrane, korišćenje zemljišta i vodnih kapaciteta istovremeno utiču i na klimatske promene i na zdravlje. Postoje jasni dokazi da globalno zagrevanje postoji. Bez hitne, neposredne aktivnosti u vidu promene načina života i stavova, efekti na globalni klimatski sistem mogu biti nagli i nepovratni, ne štedeći nijednu zemlju, uzrokujući sve češće i sve jače toplotne talase, kišne oluje, tropske ciklone i promene nivoa mora već u ovom veku. Zdravstvena struka, svesna da klimatske promene štete zdravlju, u prvim je redovima u borbi s uticajima klimatskih promena. Da bi se zdravlje sačuvalo od uticaja klimatskih promena, neophodno je da ojačamo i reformišemo postojeće zdravstvene sisteme i da se bavimo ovim problemima kako na lokalnom, tako i na globalnom nivou.