Co-funded by
the European Union

GreenKG
ЖАШЫЛ ЖАНА САНАРИПТИК УНИВЕРСИТЕТ
GREEN AND DIGITAL UNIVERSITY

Introduction to Green Technologies: Environmental Issues and Their Impact on Health

Department of General Hygiene of the I.K. Akhunbaev Kazan State Medical Academy

PhD,associate professorSultashev DiamondZhusupbekovich

Introduction to Green Technologies

- **Green technologies** — these are technologies aimed at minimizing the negative impact on the environment and promoting sustainable development.
- **They include:**use of renewable energy sources, reduction of pollutant emissions,energy- and resource-saving solutions, waste recycling, as well as the development of environmentally friendly materials and production methods.
- **Target:** improving quality of life, protecting ecosystems and maintaining a healthy planet for future generations.

Introduction to Green Technologies

- **Examplesapplications:energy,transport,agriculture,medicine.**
- **Energy:**Solar panels - using solar energy to generate electricity, reducing dependence on fossil fuels and reducing CO emissions2.
- **Transport:**Electric vehicles are electric vehicles that reduce greenhouse gas emissions and air pollution in cities.
- **Agriculture:**Organic farming is the use of natural methods of growing crops without the use of synthetic pesticides and fertilizers.
- **Medicine:**Energy-efficient hospitals are medical institutions that use technologyenergy efficientlighting, water purification and solar panels to reduce environmental impact.









Application of green technologies in medicine

- **Energy efficientbuildings and equipment**
- **Controlmedical waste**
- **Usagerenewable energy sources in medicalinstitutions**

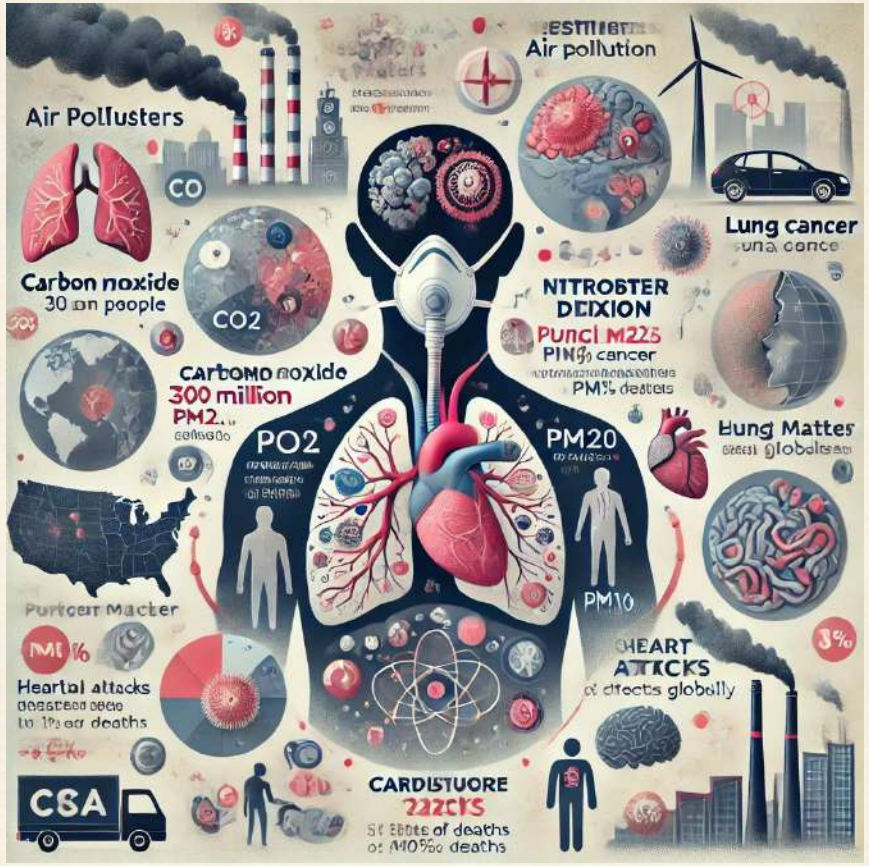


Environmental factors affecting health



- Pollutionair
- Pollutionwater
- Pollutionsoils
- Toxicwaste and chemicals

Major pollutantsair



- **Carbon monoxide (CO)- a poisonous gas that can cause poisoning if inhaled**
- **Nitrogen dioxide (NO2)- irritates eyes and respiratory system**
- **Particulate matter (PM2.5 and PM10)- very small particles that can penetrate deep into the lungs**

Influence:

- **Diseasesrespiratory system: asthma, COPD, lung cancer**
- **Influenceon the cardiovascular system: heart attacks,strokes**

Water pollution and its consequences







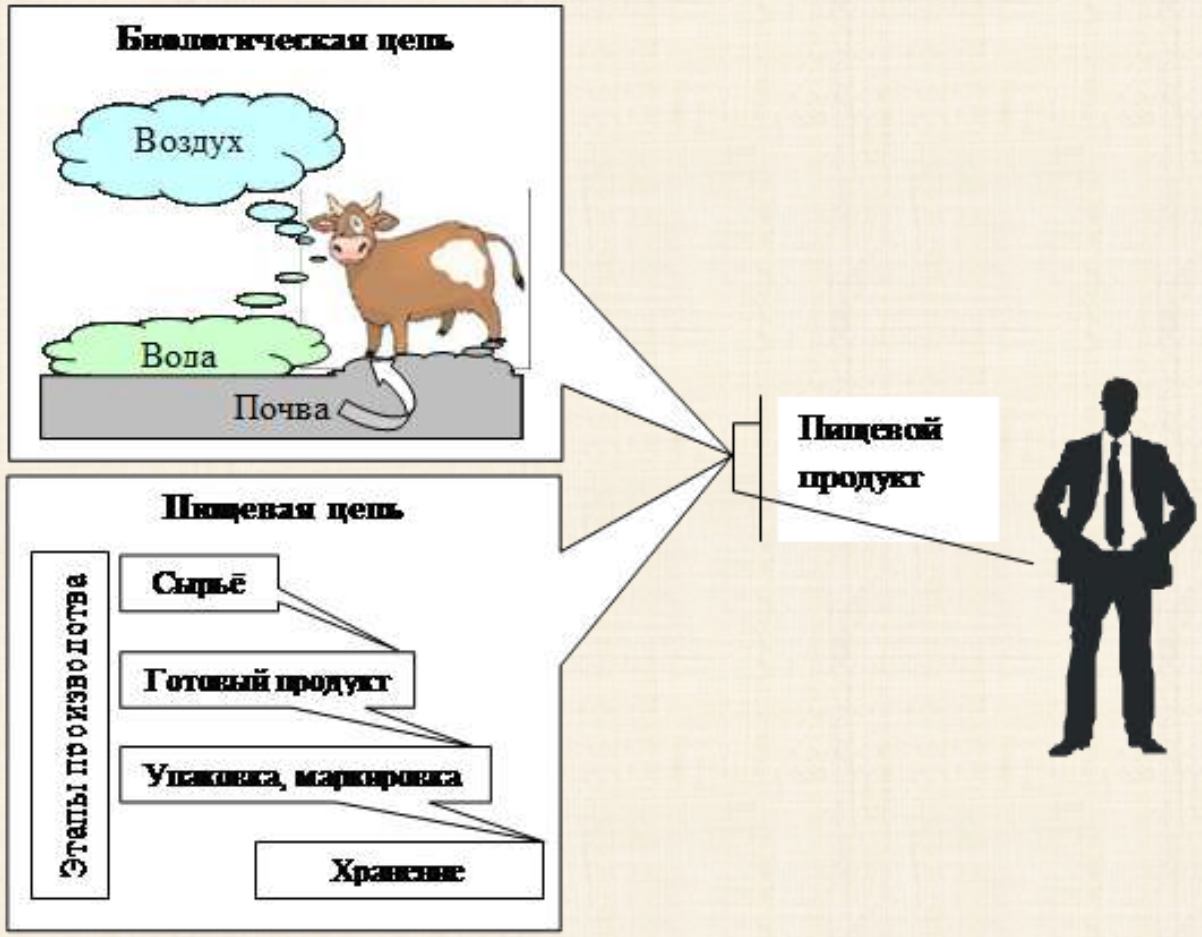
❑Chemical contaminants:

- **Heavy metals(chronic poisoning, damage to the kidneys, liver, nervous system, anemia, cognitive impairment (especially in children), cardiovascular diseases).**
- **Pesticides(chronic poisoning, disruption of the endocrine system, development of cancer (for example,lymphomasand leukemia), infertility, respiratory diseases.**
- **Pharmaceuticalsin the environment (antibiotic-resistant infections, hormonal disorders, toxic effects on the liver and kidneys, allergic reactions).**

❑Biological pollution:

- **Bacteria(acute intestinal infections, dysentery, sepsis, pyelonephritis.**
- **Viruses(hepatitis A, hepatitis B, viral gastroenteritis, respiratory infections, immune disorders).**
- **Parasites(amebiasis,giardiasis, infectious intestinal lesions, liver and pancreatic diseases).**

Soil pollution and its impact



Reasonspollution:pesticides, industrial waste, heavy metals

- **Influenceto your health:**poisoning, risk of cancer, immune system impairment
- **Biomagnification**toxinsin foodchains

Global environmental problems







- ✓**Climate change:** Rising global temperatures are leading to melting glaciers, rising sea levels, and more frequent and intense natural disasters such as hurricanes and floods. This is making agriculture more difficult and leading to population displacement.
- ✓**Depletion of natural resources:** Overuse of fossil fuels such as oil and gas, as well as water and forest resources, is leading to their depletion. For example, excessive deforestation inAmazoniathreatens environmental sustainability and disrupts climate cycles.
- ✓**Decreased biodiversity:** Habitat destruction, poaching, and pollution are leading to species extinction. For example, the disappearance of bees threatens agricultural crops that rely on pollination.
- ✓**Environmental pollution:** Industrial waste discharges into water and air lead to ecosystem pollution. An example is the world's oceans, polluted by plastic waste, which threatens marine life.

Climate change







- ✓ **Causes: greenhouse gas emissions (CO2, methane):** Industrial production, transportation, agriculture, and energy production emit carbon dioxide (CO2) and methane (CH4), which trap heat in the atmosphere, contributing to global warming. For example, the extensive use of fossil fuels in electricity generation and motor transport is a major source of CO2 emissions.
- ✓ **Consequences** — Rising temperatures, extreme weather events: Global warming leads to an increase in average temperatures, which triggers an increase in the frequency and intensity of extreme weather events, such as droughts, hurricanes, and floods. For example, the increase in the frequency and intensity of hurricanes in the southeastern United States is linked to climate change.
- ✓ **Impact on health** Heat stress, spread of infections, and poor air quality: Rising temperatures increase the risk of heat stress and heat stroke, especially in the elderly and those with chronic illnesses. Warming also contributes to the spread of infections such as malaria and dengue fever due to the expansion of the range of insect vectors. Furthermore, climate change worsens air quality, increasing the incidence of respiratory diseases such as asthma.

Depletion of natural resourcesresources

1.Exhaustionnatural resources— is the process by which the consumption of natural resources exceeds their natural rate of replenishment. This includes both renewable and non-renewableresources such as forests, fresh water, and minerals. The gradual depletion of natural resources leads to negative consequences for the environment and human health..

2.Examplesresource depletion:

- **Clearingforests:Large-scale deforestation for agriculture and construction leads to loss of biodiversity, deterioration of air and soil quality, and climate change..**
- **Disappearancefresh water reserves:Water resources are rapidly depleting due to overuse in agriculture, industry, and domestic settings. Climate change is exacerbating this problem, leading to droughts and drinking water shortages..**
- **Exhaustionminerals:Constant extractionnon-renewableresources such as oil, coal and metals, reduces available reserves and causes irreversible changes in ecosystems.**

3The Impact of Resource Depletion on Health:

- **Shortagedrinking water:The disappearance of fresh water reserves leads to problems with the supply of clean water to the population, which causes outbreaks of intestinal infections, dehydration and even death in arid regions..**
- **Decreasefood security:A shortage of natural resources, such as water and fertile land, reduces food production, leading to hunger and poor nutrition. Malnutrition and vitamin deficiencies can lead to chronic diseases and a weakened immune system..**







Loss of biologicaldiversity



✓ **The impact of biodiversity loss on health:**

- **Decreasefood security:**Decreased plant and animal diversity impacts agriculture and food systems by reducing food availability..
- **Heightnumber of diseases:**Lossecosystemservices, such as natural barriers to the spread of infections, leads to an increase in the incidence of animal-borne diseases (e.g. malaria, dengue fever).
- **Deteriorationecosystem quality:**Disruption of ecosystem balance can lead to an increase in pests and deterioration of air and water quality, which negatively impacts human health..

✓**Pathscombating the loss of biodiversity:**

- **Creationprotected areas and nature reserves:**This helps protect species and ecosystems from destruction..
- **Decreasegreenhouse gas emissions:**Combating climate change helps conserve species' habitats.
- **Promotionsustainable agriculture:**Applying methods that minimize environmental impacts and preserve biodiversity.
- **Educationand awareness:**Raising awareness of the importance of biodiversity and its impact on human health and ecosystems.

Ecologicaldiseases



Environmentally induced diseases:

✓**Asthma:**It is a chronic inflammatory disease of the airways that is often caused by air pollution, including exhaust emissions, industrial dust and fine particles (PM2.5 and PM10).

✓**Allergies:**Allergic reactions to pollen, mold, and chemicals may be exacerbated by climate change and increased concentrations of allergens in the air, leading to more severe symptoms in patients..

✓**Oncologicaldiseases:**Air and water pollutants such asdioxins, heavy metals (eg, lead, cadmium, mercury), carcinogens and pesticides have been linked to an increased risk of various cancers, including lung cancer, skin cancer and leukemia.

Chronicdiseases associated with environmental pollution:

✓**Cardiovasculardiseases:**Air pollution (especially fine particulate matter and nitrogen dioxide) has a significant impact on the cardiovascular system, causing heart attacks, strokes and hypertension..

✓**Diseasesliver and kidneys:**Chronic exposure to heavy metals and chemicals through contaminated water or food can lead to kidney damage and chronic liver disease..

✓**Chronicpoisoning:**The accumulation of toxins in the body over a long period of time due to exposure to chemicals, heavy metals and pesticides can lead to disruption of the nervous system, weakened immunity and organ damage..

Ecologicaldiseases







✓**Examplesenvironmental disasters:**

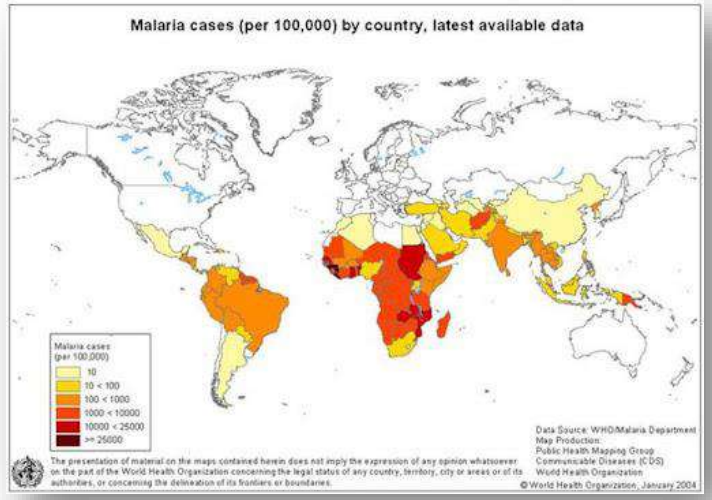
Chernobyldisaster (1986):The Chernobyl nuclear power plant accident resulted in massive radiation contamination. Consequences include increased incidence of thyroid cancer, leukemia, and other cancers among those affected..

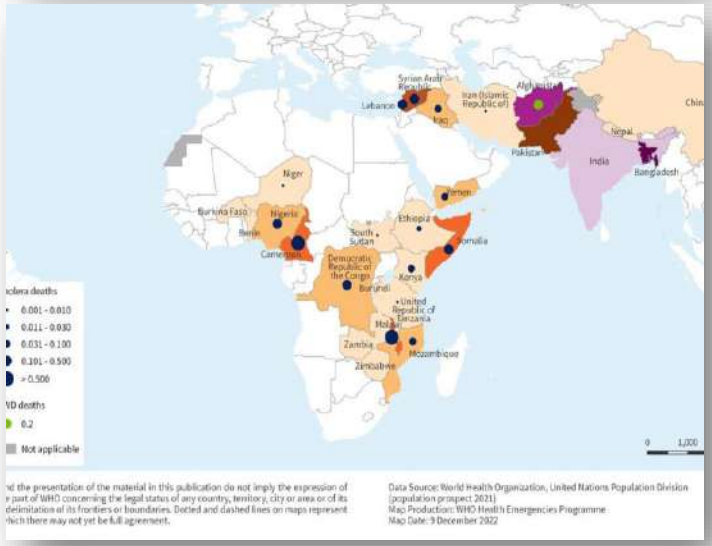
Pollutionwater in Flint (2014, USA):

Problemwater supply led to mass lead poisoning, which caused the development of neurological disorders, especially in children.

Minimata (Japan):As a result of mercury discharge into the water by chemical industry companies, local populations were poisoned with mercury, which led to damage to the nervous system and the development of "diseaseMinamata".

The impact of climate change on the spread of diseases





✓**Increaseareas of malaria and other infectious diseases:**

Changeclimate change leads to warming, changes in precipitation and humidity, which contributes to the expansion of habitats for carriers of infectious diseases, such as mosquitoes.

Malaria:Malaria-carrying mosquitoes can migrate to higher latitudes and mountainous regions where temperatures were previously too low for them to reproduce. For example, in Africa and South Asia, malaria cases are increasing in areas where the disease was previously rare..

Feverdengue:Rising temperatures and humidity are fueling the growth of mosquito populations that transmit dengue viruses. This trend has been observed in countries where dengue was previously unproblematic, such as Southern Europe and North America..

✓ **Changewater resources and outbreaks of intestinal infections:**

Climate change is affecting water supplies, leading to both droughts and floods. This alters the availability of clean water and causes outbreaks of waterborne diseases..

Cholera:During floods, polluted water contributes to the spread of bacteria. Vibrio cholerae, causing cholera outbreaks. For example, in South Asian and African countries, floods lead to an increase in cholera cases..

Intestinalinfections:Water pollution and a lack of treatment systems after natural disasters such as hurricanes and floods also lead to outbreaks of intestinal infections, as happened after the hurricane. Ike" in Haiti in 2008.

Eco-friendly diagnostic methods andtreatment





Usageenvironmentally friendly materials and equipment:

- **Biodegradable materials:**For example, in surgery and dentistry they are usedbiodegradablematerials for sutures, fillings and dentures, which reduces the amount of plastic waste.
- **Applicationenergy-saving technologies in medical devices:**The implementation of energy-saving technologies in medical devices and systems not only reduces energy consumption but also reduces the impact on the environment.
- **Energy-saving diagnostic devices:**CT scanners, ultrasound machines, and other diagnostic devices that use energy-saving technologies consume less electricity, which helps reduce the load on hospital power systems.
- **LED lighting:**LEDs used in operating rooms and offices reduce energy consumption compared to traditional lamps and minimize heat output, which contributes to comfortable working conditions and resource conservation.
- **Safe methods for disposing of medical waste:**Proper disposal of medical waste is essential to prevent environmental pollution and the spread of infections.
- **Sterilization and processing:**Modern methods make it possible to sterilize medical waste such as syringes and needles, followed by recycling of plastics and metals for reuse.
- **Eco-friendly waste disposal systems:**For example, using autoclaves to decontaminate waste helps minimize toxic emissions generated during incineration. Such technologies are already being used in medical facilities in Europe and the United States..

Global initiatives to combat environmental threats tohealth







- ✓ **GlobalAir Pollution Initiative:**The WHO calls for a reduction in pollutant emissions and the development of air quality improvement programs, as air pollution is linked to conditions such as asthma, lung disease, and cardiovascular disease. The WHO estimates that approximately 7 million people die annually due to exposure to air pollution.
- ✓ **Chemical Pollution Control Programs:**WHO also assesses the health impacts of chemical pollutants such as heavy metals and pesticides, and develops recommendations for their reduction and safe disposal.
- ✓ **Paris Agreement onclimate (2015)**HoldA global temperature increase of 1.5–2°C above pre-industrial levels. Achieving these targets will help reduce climate-related health risks, such as heat stress, the expansion of infectious disease zones, and the increase in climate-related disasters.
- ✓ **GoalsUN Sustainable Development Goals (SDGs))**(2015)17 global goals aimed at improving living conditions, protecting the environment and achieving sustainable development by 2030.
- **Goal 3: Good Health and Well-Being:**This goal aims to combat pollution-related diseases and reduce the impact of environmental factors on health.
- **Goal 13: Climate Action:**This goal calls for urgent action to combat climate change and its impacts. Implementation of this goal is aimed at mitigating the consequences of climate change, such as extreme weather events and their impact on health.
- **Goal 6: Clean Water and Sanitation:**Ensuring universal access to clean water and sanitationalso helpsprevent diseases caused by water pollution.