

ADAPTATION OF SPORTS AND LEISURE COMPLEXES NETWORK IN UKRAINIAN CITIES TO CLIMATE CHANGE

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Abstract. The climate change that is taking place all around the world today presents challenges for all inhabitants of the planet, including the citizens of Ukraine. Taking all of these circumstances into consideration, it is necessary to introduce new methods of forming the environment that meet the new conditions. The article examines the influence of climate change on the recreational spaces of Ukrainian cities focusing on the location of sports and leisure complexes and their facilities. The article explores the influence of the temperature and humidity of the recreational environment on the athletes' performance and health.

The work identifies and systematizes the positive and negative effects of the climate change on a network of sports and leisure complexes and their athletes. The main implication is that outdoor activities can cause heat stress during periods of high ambient temperature. This indicates that the existing sports and leisure complexes are not adapted to climate change. The paper studies the world's practical ways of adapting the urban environment to climate change paying particular attention to a system for alerting the population about the heat waves and informing the citizens about ways to strengthen their immunity; the creation of green and water infrastructure in cities and suburban areas; systems for objective monitoring of diseases and infectious agents affected by climate change, as well as planning for the prevention of these diseases; ensuring the population's access to clean drinking water and monitoring compliance with the technology of disinfection and purification. The study, premised on this analysis, has provided several proposals for adaptive measures implemented while designing a network of sports and leisure complexes in the architectural and urban planning aspects. It is predicted that such measures will help visitors adapt to climate change.

It enables us to develop approaches for forming a future network of sports and leisure, taking into consideration cities' changing climatic conditions.

Keywords: Ukrainian cities, climate change, athlete's performance, climate adaptation, the network, sport and leisure complex.

Introduction. Climate (from the Greek Κλίμα – slope) is the long-term pattern of weather in a particular area. It is formed due to the interaction of cosmic, atmospheric, and terrestrial natural factors, and together with other natural components, it creates a natural habitat. Together, these factors are climatic, although more accurately they are called astronomical, modern climate-forming and geographical factors.

The main astronomical, modern climate-forming and geographical factors include cosmic, ultraviolet, light, thermal, and radio wave radiation which reaches Earth from the Sun and the stars; temperature, humidity, mobility, atmospheric pressure, and other meteorological factors; chemical composition of the air; electric, magnetic and gravitational fields of the Earth; geographic latitudes, the height of the area above sea level, landscape zones; seasonal and daily periods. At the same time, the characteristics of the climatic conditions of each region have their own peculiarities. In particular, in order to characterize the climatic conditions that have developed on the territory of the Poltava region (and neighboring regions), the most important is the magnitude and nature of solar radiation, the remoteness of the territory from large water masses (oceans), relation of the territory to the zones of predominantly Atlantic temperate and arctic cold air masses, flatness of the territory [1].

Throughout the course of history, human activity is clearly connected with the environment. At first, it was a usual natural environment, which was gradually transformed to meet peoples' various needs. In the end, it resulted in the appearance of a natural-anthropogenic environment. Then, thanks to new technologies, certain types of artificial environments were created. Now it is possible to divide environmental types according to the level of development or cultivation into such types: natural, natural-anthropogenic (*landscaping is added to the natural environment*), anthropogenic-natural (*natural components are introduced to the artificial environment*) and artificial (*used mostly at great depths of the sea or in space*) [2]. Typically, architects work to create or form natural-anthropogenic and anthropogenic-natural types of environment, which include the environment for the full functioning of sports and leisure complexes in the structure of the city.

Most of the types of sports that are developed in sports and leisure complexes have appeared through the interaction between people and the environment of the city. *Skateboarding* was first invented in the 1950s in California, where surfers used schoolyard to simulate waves on days when they were low [3]; *The Parkour* adventure began in France in the 1990s, in Lisses on the outskirts of Paris. David Belle originally developed the Parkour concept according to precepts about the art of movement laid down by his father Raymond Belle, who was a Parisian firefighter and veteran of the French Special Forces. For them, Parkour was just a kind of training method to overcome all forms of obstacles in urban and natural environments, such as forests [4]; *Roller skiing* was born from the training of skiers in the summer months when there was no snow. The sport was born in Italy and Northern Europe in the mid-30s of the 20th century [5]; *Kickscooting (or extreme scootering)*, the first athletes of this sport, appeared in the 1990s – early 2000s. This sport is based on two disciplines: *street* and *park*. In the park discipline, athletes perform amplitude tricks in skate parks. And in the street discipline, the rider has to do the sliding and jumping from the stairs on the natural landscapes of the city streets [6].

Finally, it can be argued that the development of sports inherent in sports and leisure complexes also led to the emergence of special sports facilities that can serve as the basis for their further improvement. However, until recently, the climatic conditions of the environment that affect these objects were taken for granted, while the consequences of possible changes in the natural environment were mostly ignored because it is known that sport and the environment have a two-way relationship [7, p. 2]. In general, the data mentioned above indicate the relevance of issues related to the vulnerability of Ukrainian cities to climate change and the introduction of sustainable methods for adapting the network of sports and leisure complexes to the structure of these cities in particular.

Analysis of research sources and recent publications. The results of the research have their own characteristics, a brief analysis of which showed the following. Monograph Boyko O. P. "Leisure culture in a risk society" [8] is devoted to the research of transformational processes and prospects for the development of leisure culture in a risk society. The author proved that leisure as a phenomenon is ambivalent. On the one hand, recreational activity provokes and intensifies those risky situations created by a human; on the other hand, it has powerful recreational potential. All of these generate great interest in leisure activities in the modern world.

The conducted studies of Bogushenko A. O., and Khomenko I. A. regarding the vulnerability of four cities of Ukraine (Kyiv, Odesa, Uzhgorod, Poltava) show that all cities have become more vulnerable to increased temperature over the past twenty years [9, p. 12].

In general, scientists have already reached a global consensus that the climate has changed over the past 150 years, mainly due to human activity. Global temperatures are increasing, rainfall patterns are becoming more unpredictable, and sea level is rising. These trends are expected to continue in the next decades. Depending on the geographical features of the location of the settlement, the consequences of climate change can be various [10]:

- abnormally high temperatures lasting a certain amount of time and causing "urban heat islands" and heat stress for residents;
- flooding and landslides;
- the increased vulnerability of urban green areas and their decline;
- natural hydrometeorological phenomena, increasing their frequency and destructive impact on infrastructure;

- deterioration in the quality and a decrease in the quantity of drinking water in a certain area;
- an increase in the number of infectious diseases and allergic reactions among the population;
- increased vulnerability of the energy systems of the settlement to destruction, which disrupts the stability of the energy supply [9, p. 11].

Civil society and The International Committee of the Red Cross and Red Crescent Movement play an important role in raising awareness of the authorities and the public about the risks of climate change and encouraging people to act on those risks. The Climate Forum East is a project within the six countries of the Eastern Partnership aimed at strengthening the capacity of civil society in its interaction with decision-makers on these issues and encouraging the youth and local communities to respond to challenges faced by their countries experiencing climate change [10, p. 4].

The signs of climate change mentioned above, affect urban residents differently, depending on their gender, age, income, and physiological characteristics of the body. However, the presented facts indicate that when considering the formation of a network of sports and leisure complexes (SLC) in the structure of the largest cities of Ukraine, it is extremely important to pay attention to abnormal heat, the vulnerability of urban green areas and disruption of the urban infrastructure. In many respects, the success of reducing the negative impact of climate change on a person and the environment depends on the effective architectural and urban integration of the SLC network into the structure of settlements.

Purpose and objectives. The purpose of this work is to determine adaptive measures for the formation of a network of sports and leisure complexes in the structure of Ukrainian cities in the context of climate change.

To achieve the goal, the following tasks were solved:

- analysis of studies on the impact of climate change on Ukrainian cities;
- analysis of works on the impact of climate change on the performance and health of athletes;
- existing measures are taken by sports organizations to adapt to the effects of climate change.

Methods. The main methods for achieving the set goal are terminological analysis, the method of observation and analysis of modern scientific sources on the impact of climate change on existing sports and leisure facilities, and physical activity and recreation (restoration of physical and spiritual strength) of a person. Since the impact of climate change on sports and leisure facilities is a poorly researched topic, therefore, there is no sufficient understanding of the scope and the nature of the evidence presented in the literature.

The base material and results of research. Over the past 30 years, the Ukrainian Hydrometeorological Center has recorded new climatic anti-records in most cities of Ukraine [9, p. 11]. The change in the maximum temperature during two periods (I – 1961-2005 and II – 2016-2019) in the largest cities of Ukraine is in Kyiv from 38 to 39 °C, Kharkiv from 40 to 41 °C, Odesa from 40 to 41°C, Dnipro from 40 to 41 °C, Donetsk from 39 to 41 °C, Zaporizhzhia from 40 to 41 °C, Lviv 36 °C (no change) (Fig. 1).

Since 2019, it is no longer about changes, but also about a climate emergency (as defined by the UN). The temperature has risen to 1.1-1.2 °C compared to the pre-industrial period (i.e. before the 1850s). As Natalya Gozak, executive director of the Ecodia Center for Environmental Initiatives, explains: "International experts say that when the temperature rises above 1.5-2 °C, it will be difficult for humanity to lead a lifestyle which they are accustomed to. There will be problems with water supply, droughts, and some regions will become uninhabitable" [11].

The problem of increased air temperature and humidity worsens indicates that global warming will reach 1.5 °C between 2030 and 2052, and approximately 3 °C in 2100, which will have a devastating impact on cities [12]. This becomes one of the immediate issues in the formation of the SLC network because these spaces are the main place for city residents to do sports and leisure activities or spectating them. When the sports environment becomes too hot for normal physical activity, it can lead to heat stress. In such a state when the body cannot cool down properly, therefore the internal temperature of the body continues to rise to a dangerous level and key organs may suffer and gradually reduce their functions. This also happens because a person cannot sweat because the air is too humid.



Fig. 1. The maximum temperature, °C [9, p. 13]

Outdoor activities during periods of elevated ambient temperatures can lead to increased body temperature and dehydration, which can cause heat exhaustion or heat illness. Risks of heat stroke or heat illness while playing or spectating at sport competitions; these risks depend on both environmental factors (e.g. hot weather) and personal factors (e.g., age, poor physical fitness, health conditions) [13].

Thermal stress and thermal comfort were identified as possible risks for athletes in the sports of cycling, tennis and football (these sports are presented in SLC). Researchers found that the primary health consequences of thermal stress include heat exhaustion, heat stroke, and hyperthermia. Due to prolonged exposure (i.e., playing sport outside in hot conditions) and the physical exertion involved in sport, athletes may be at higher risk for experiencing heat-related illnesses compared to spectators or the general population [7, p. 8] (Fig. 2).

The main goal of the formation of the SLC network is to provide high-quality, comfortable, and affordable sports and leisure activities for all sectors of society. Such activities are aimed to provide people with an opportunity to do sports in order to improve their health.

In the context of the pandemic, it was possible to observe how the importance of open public spaces, namely the SLC, increased due to the necessity for people to stay at home, away from the offices, or other premises [9, p. 24]. This indicates that sports and leisure spaces that are designed without considering climate change will be harmful for visitors, such as calisthenics athletes (people who do not do sport professionally, but what to be physically healthy and keep fit).

This paper draws attention to the impact of climate change on calisthenics athlete in the context of the infrastructure of the SLC, located mainly within parks, squares, and recreational areas of the city. Of course, not only athletes but also people with children can suffer from heat waves in the open spaces of the SLC (in Ukraine, these are mostly women: mothers, grandmothers, nannies, also people with disabilities, etc.). High temperatures, especially in summer, do not allow one to feel comfortable while walking or cycling between poorly designed SLC spaces and will directly affect the health of these people.

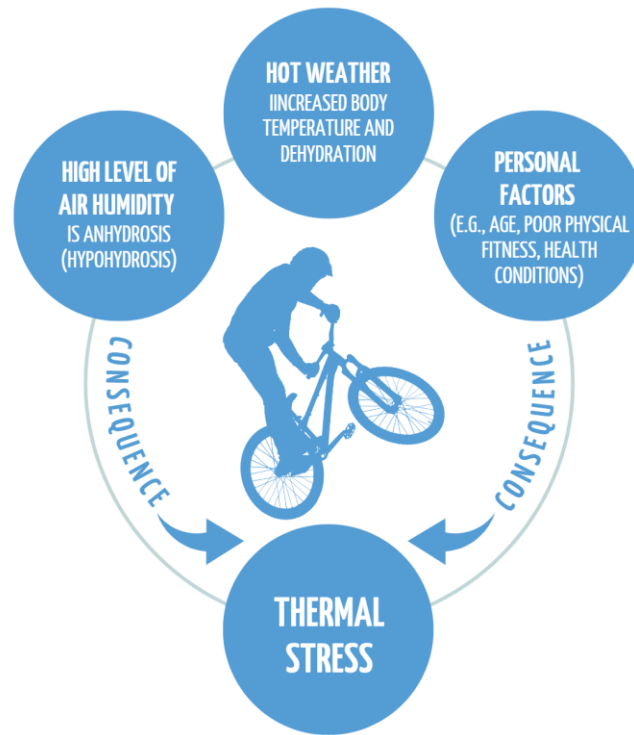


Fig. 2. The reaction of the athlete's body to outdoor activities during periods of elevated ambient temperature

It can be assumed that women and children are disproportionately affected by heat waves within sports and leisure spaces, for example, on playgrounds without tall trees. In the current State building codes of Ukraine (Change №2 DBN B.2.2-5:2011. Playgrounds. Improvement of adjacent territories. Norms and Rules) and sports (DBN B.2.2-5:2011. Sports grounds. Improvement of adjacent areas. Improvement of the territories) of the sites, landscaping of these spaces are already envisaged. At the same time, these norms are designed for new sites. Currently, there are no control mechanisms so that the sites built according to the old norms (DBN B.2.2-5:2011. Landscaping) are updated and landscaped [9, p. 25].

Research shows that green spaces improve physical and mental health. For example, in areas with a lot of trees, residents are less likely to get asthma. Comfortable green spaces encourage the elderly and children to do sports. In addition, they create a therapeutic effect for people with mental illnesses [14]. The disappearance of green areas will have a disproportionately negative impact on athletes, as they are more dependent on comfortable outdoor sports and leisure areas.

The infrastructural changes differ based on the hazard, but range from adding shade or fans along the course of a marathon route, to installing outdoor cooling technologies for open-air stadiums, to building brand new facilities [7, p. 9]. Protection against overheating in the SLC territory can include slowing down or pausing for a water break, changing equipment (e.g., to reduce the number of layers worn [15]), or reducing the time for sports, which affects the performance of the athlete.

Adaptation of the urban environment to climate change can be achieved in different ways. For example, in the United States and some other countries, a system of measures to alert the public about heat is widespread. It helps to reduce the negative impact of hot weather on public health. In the world, measures are also used to reduce the negative effects of climate change on the health of the population of large cities, in particular, this is the creation of a system for objective monitoring of diseases and pathogens affected by climate change, as well as planning work to prevent these diseases. Particular attention is paid to informing the population about ways to strengthen the immune system to form the body's resistance as well as providing residents with access to clean drinking water and monitoring water disinfection and purification technology. Furthermore, there is a campaign to raise public awareness about the impact of climate change on the emergence of new

allergens and the spread of certain diseases (their symptoms and giving first aid) [16].

In addition, calisthenics athlete need to be provided with water, and medical care on the territory of the SLC, which may respond to the consequences of overheating or injury, and offering athletes access to a cooling agent (e.g., cooling towel, mist showers [17]).

Infrastructural upgrades and equipment changes were also commonly invoked as an adaptive strategy that may help sport organizations to manage the impacts of heat [18]. To prevent this, "cool materials" are used in construction and arrangement. Such materials could lead to the decrease in surface/ambient temperatures and thus significantly improve the thermal comfort in public spaces [19]. At the same time, cold benches on the territory of the SLC, for example, may not be suitable for use at low temperatures in winter.

The availability of drinking water sources at sports and leisure venues at high temperatures is critical, especially for vulnerable groups such as athletes, children, the elderly, and people with chronic diseases. The infrastructure of the existing SLC does not mainly provide access to drinking water. As a result, people may not be able to buy water in a shop or cafe, and free water in drinking fountains may be of poor quality and does not meet sanitary standards, and require the installation of filter systems.

In some cities there are systems of public pump rooms, but their water is not always of high quality. According to the latest estimates of the communal enterprise Kyivvodfond, the water in the pump rooms of Kyiv, for the most part, complies with the standards. At the same time, there are doubts that such a check is carried out in other cities of Ukraine. The pump rooms are often the only source of water for SLC visitors, in conditions of high temperatures, but it can be harmful to them [9, p. 25].

Today, some municipal infrastructure functions are being transferred to private commercial institutions. This means that access to the basic needs of some people who want to spend their leisure time outdoors is limited to a certain extent.

As an emerging literature, the most consistent thread across the studies is the importance of benchmarking past and current conditions for sport and setting parameters around what is considered safe playing conditions for competition. These parameters, once established through further research centered on the health and safety of players and spectators [15, 17], will impact adaptation requirements and innovation [18]. They could also impact the general organizing principles of sport [7, p. 10].

An increase in the water level in rivers, lakes, and seas can harm the infrastructure of the SLC in the structure of parks, squares, and waterfront area, and destroy it. In addition, staying in sports and leisure spaces during bad weather or heat waves poses a threat to visitors, especially athletes. For example, they cannot isolate themselves indoors, and may not have the means of communication to report a threat to their life and health.

People on low often live in the outskirts of the city. Residents of peripheral areas have to use additional means to get to SLC, spend more time on public transport, or use private transport compared to residents of central areas who travel short distances on foot. Unlike residents of central districts, who walk short distances, residents of peripheral areas have to use additional means such as public or private transport to get to SLC. During periods of high temperatures, long journeys on routes that are not adapted to climate change can cause heat stress or increase the likelihood of the appearance and development of chronic diseases. Therefore, the network approach improves conditions for residents of peripheral areas, since the uniform location of the SLC in the city and the presence of green corridors connecting the SLC with each other will make the distance to the SLC less time-consuming and more comfortable for visitors of these facilities.

In addition, frequent and unpredictable abnormal weather conditions cause the destruction of trees and the reduction of green spaces as SLC is a part of these spaces. For example, flooding erodes the ground under trees, exposing their roots. This makes the trees more vulnerable to strong winds. As it was mentioned earlier, green spaces are important in sports and leisure facilities because they protect people from overheating. In Ukraine, there is a separate state-building norm regarding and flooding of structures (DBN V.1.1-25-2009. Engineering protection of territories and structures from flooding). However, in sports facilities, not only buildings can be affected, but also sports equipment in there.

In many countries of Europe and the world, one of the ways to adapt is the creation of green and water infrastructure in cities and suburban areas. This combination of water and plants is beneficial way to respond to climate change. First, during heavy rains, green corridors, which are a combination of water and plants, act like a sponge, absorbing large volumes of water when no sewerage system can handle it. Secondly, dense tree planting holds back gusts of wind. Thirdly, green spaces absorb carbon dioxide, thereby combating both the causes and consequences of climate change [11].

The first part of the study reports on the impact of climate change on the performance and health of athletes. It allowed us to compare existing data on the impact of climate change on the athlete and their professional space. In addition, on the basis of this information [20], which indicates the consequences of climate change by the middle of the 21st century in Ukraine, one can understand how the city-planning capital of Ukraine will adjust to it. This made it possible to hypothetically formulate adaptive measures for the formation of the SLC network in the structure of cities (Fig. 3):

1. *A further change in the thermal regime may have a significant impact on the Ukrainian energy sector.* The positive consequences of global warming for the energy sector may be a decrease in a number of energy sources needed for sports facilities during the winter period [21, p. 25]. However, the optimum temperature for human life is on average 18-22 °C. Physical activity at a heart rate of 140-150 mail/min is the most effectively done at a temperature of 16-17 °C. At a heart rate of 170-180 mail/min the comfort zone for an athlete is 13-14 °C. Maintaining a comfortable temperature regime for athletes during a hot season will lead to a partial increase in energy consumption for air conditioning, thereby balancing energy costs.

2. *Warming will lead to a significant increase in the mineralization of groundwater, and consequently to their limited use.* The reserves of drinking water with the temperature increasing up to 2.5 °C practically will not change, but if it rises to, by 5-6 °C the reserves can decrease by 10-15% [20, p. 19]. It is very important for athletes to replenish their water-salt balance and not cause dehydration. Therefore, it is not only necessary to install drinking fountains on sports and leisure grounds, but also to think in advance whether there will be enough supply from a separate source or how to collect rainwater and purify it locally.

3. The best-case scenario of global warming (temperature increases up to 2.5 °C) will lead to shorter and milder winters with a temperature of 2-3 °C and their reduction. With a temperature of 2.5 °C or more prominent warming in some regions, winters may disappear altogether [20, p. 20].

Changes in air temperature and precipitation will significantly affect the recreational potential of Ukraine. A decrease in the amount of snow, the duration of the winter season will significantly decrease the share of recreational activities during this period. As a result, it will lead to unprofitability or incomplete use of the possibilities of winter sports facilities. Particularly susceptible to rising temperatures are winter activities in the Carpathian recreational region due to the melting of snow cover and extreme weather conditions [21, p. 25-26]. This encourages people to show greater interest in developed sports and leisure spaces in the region. A wider range of services offered by the SLC should be planned for the future.

4. *The greatest peak of recreational activity will be observed in summer in July-August.* However, an increasing number of hot days may encourage some potential holidaymakers to change the time of their vacation and spend it in other regions that are outside Ukraine [21, p. 26]. This stimulates owners to include water bodies in the SLC and provide other services such as (e.g., catering in restaurants, and cafes). It is also well-known fact that when preparing for competitions in a hot climate, you need to train in similar conditions for 10-14 days. This information gives an understanding that it is necessary to inform and instruct the population how to prepare for a hot season.

5. *The expected increased temperature will lead to the instability of the snow cover and a decrease in the proportion of rivers fed by meltwater.* In the worst case scenario, this will lead to the shallowing of many small rivers in the mountainous and foothills. In summer, the situation is somewhat better, as the total water loss is replenished by frequent rains and an increased proportion of rivers which are fed by underground sources. Therefore, the most resistant to climate change will

be the rivers with underground springs. Intense rain floods will have a significant impact on runoff. The total value of river runoff may decrease in the northern regions by 5-7 %, and in the southern regions by 15-30 % [20, p. 20].

The situation with small rivers can become especially threatening, most of which are fed mainly from meltwater, and 80 % of their river runoff is during spring floods. As a consequence of global warming, many of these rivers may cease to exist due to a decrease in snow reserves, and floodplains will disappear along with them, which will mean the deprivation of a significant amount of moisture that these floodplains retain throughout the year [20, p. 20].

Global warming will unequivocally lead to an increase in the sea level of the Black and Azov Seas, which in turn will intensify the processes of coastal erosion, flooding and salinization of soils in the Black Sea region, and will also lead to significant changes in the ecosystems of the estuaries of the Danube, Dnieper, and Dniester [20, p. 20]. Therefore, the location of the SLC, which in practice gravitates towards water sources, should be near rivers with underground springs and have a certain radius of indentation from the coastline.

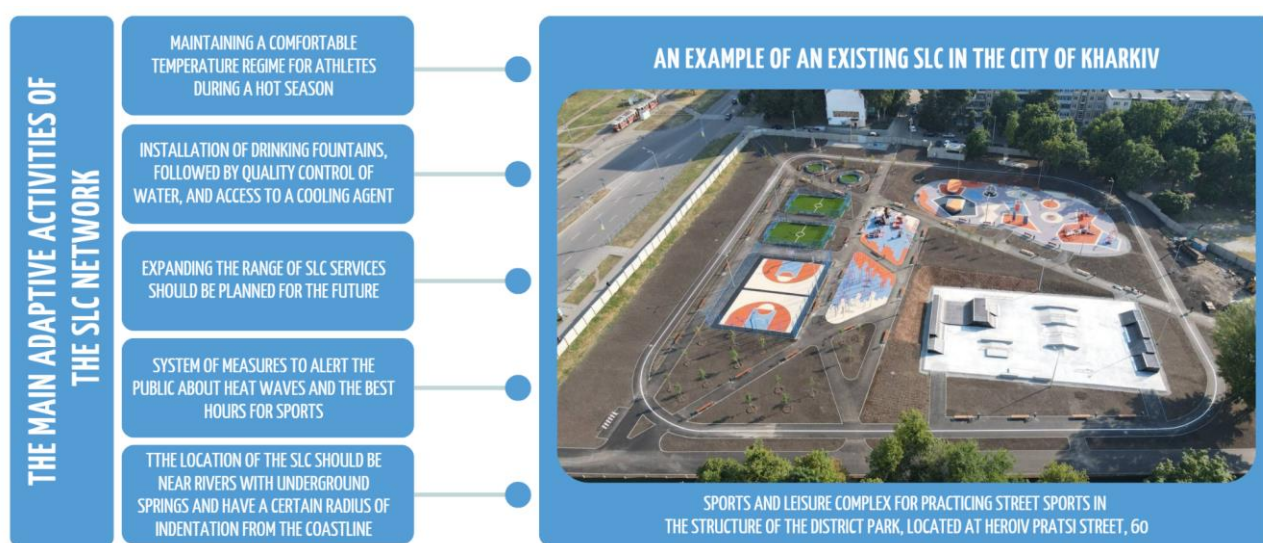


Fig. 3. The main adaptive measures for the network of sports and leisure complexes in the structure of Ukrainian cities in new climatic conditions

The adaptation of the SLC network in the structure of Ukrainian cities provides steps that allow visitors to adapt to changes:

- first of all, you should understand that there are already changes. It is necessary to estimate vulnerability assessment of the city to climate change so that scientists analyze and work out several scenarios (climate change adaptation and mitigation plan);
- if earlier we considered streets, roads, and houses as urban infrastructure, now we need to add water-green objects to them, in this case, green corridors (a combination element between the SLC), because they act as a full-fledged engineering system. Such zones will be green reservoirs of clean and cool air in summer and will soften the microclimate in winter [11];
- in terms of regulatory support, the development of a green space should be regulated, since it contributes to the improvement of the physical and mental health of the population. The percentage of SLC developments in the structure of green spaces should be no more than 30%;
- drinking water supply at sports and leisure facilities with further monitoring of water quality;
- access to a cooling agent (e.g., cooling towel, mist showers) and water spaces (e.g., swimming pools);
- adding shade or fans along the routes to SLC and around sports areas;
- use of appropriate materials for sports equipment;
- there should be a system of measures to alert the public about heat waves.

Conclusions. In the course of the study, certain general results can be pointed out. The main of which are stated further.

Among the factors selected for this analysis were the magnitude and nature of solar radiation, the remoteness of the territory from large water masses (oceans), the relation of the territory to the zones of predominantly Atlantic temperate and arctic cold air masses, and the flatness of the territory. According to environmental types based on the level of development, it was advisable to choose natural-anthropogenic and anthropogenic-natural types of environment, which include the environment for the full functioning of the SLC in the structure of the city.

An analysis of the results of recent studies that have already been published showed that the largest cities of Ukraine have become more vulnerable to climate change in the last years of the 21st century, where the absolute temperature maximum of cities has risen by an average of 1 °C. This sparks scientists' interest in studying the problems of transformational processes and the prospects for the development of a leisure culture in the abnormal heat, the vulnerability of urban green spaces, and disruption of the functioning of urban infrastructure. One of the promising solutions for overcoming the negative impact of climate change in Ukrainian cities can be the effective architectural and urban integration of the SLC network into the structure of settlements. Such a system of SLC allows the population to adapt to new climate changes and survive in these conditions. In addition, it lets us divide cycling routes according to their actualization and necessity in the new conditions.

Also, the study revealed that outdoor sports activities during periods of high ambient temperature can lead to thermal stress, which is caused by humid air, high ambient temperature, and personal physical abilities of the visitor. This indicates that the existing sports and leisure spaces are not adapted to climate change. They do not have air conditioning systems, shady awnings, and access to drinking water.

In general, the quality of existing open sports and leisure spaces will only deteriorate in the future due to rising temperatures, the destruction of green spaces, and other abnormal weather events (flooding, hurricanes, fires). Therefore, when implemented, the results of the study (the main adaptive measures for the SLC network) allow visitors of these spaces to adapt to climate change. The expansion and research of a more accurate list of adaptive measures for the formation of a network of SLC in the structure of cities is the prospect of further scientific developments.

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ПРО АДАПТАЦІЮ МЕРЕЖІ СПОРТИВНО-ДОЗВІЛЛЄВИХ КОМПЛЕКСІВ МІСТ УКРАЇНИ ДО ЗМІНИ КЛІМАТУ

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Анотація. Кліматичні зміни, що відбуваються сьогодні в планетарному масштабі, стають викликами для усіх мешканців планети, в тому числі й для жителів українських міст. З погляду на ці обставини впровадження нових методів формування їх середовища, що відповідатимуть новим умовам, є вельми актуальним. У статті розглянуто вплив зміни клімату на рекреаційні простори українських міст в контексті розміщення наявних спортивно-дозвіллевих просторів та їх благоустрій. Також приділено увагу впливу температурно-вологісних характеристик рекреаційного середовища на результативність спортсменів та стан їх здоров'я.

Загалом в роботі виявлено та систематизовано позитивні та негативні наслідки зміни клімату для розвитку мережі спортивно-дозвіллевих комплексів та спортсменів. Основним фундаментальним наслідком є те, що спортивна активність на відкритому повітрі у періоди підвищеної температури навколишнього середовища може призвести спортсмена до теплового стресу. Це свідчить про те, що існуючі спортивно-дозвіллеві комплекси не є адаптованими до змін клімату. У роботі розглянуті наявні у світі практичні шляхи адаптації середовища міста до кліматичної зміни: система заходів з оповіщення населення про спеку та інформування населення про способи зміцнення імунітету; створення зеленої та водної інфраструктури міст і позаміських територій; такі заходи як системи об'єктивного моніторингу захворювань та збудників інфекцій, на які впливає зміна клімату, а також планування робіт з профілактики цих захворювань; забезпечення доступу населення до чистої питної води та здійснення контролю за дотриманням технології знезараження та очищення води. На основі цього аналізу надано низку пропозицій щодо впровадження адаптивних заходів при організації мережі спортивно-дозвіллевих комплексів в архітектурно-містобудівному аспекті. Прогнозується, що такі заходи допоможуть відвідувачам пристосуватися до кліматичних змін.

Надалі це дозволяє визначити підходи до формування перспективної мережі спортивно-дозвіллевих комплексів в структурі міст в нових умовах.

Ключові слова: українські міста, зміна клімату, результативність спортсменів, кліматична адаптація, мережа, спортивно-дозвіллевий комплекс.

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