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## IMPACTS OF GLOBAL CLIMATE CHANGE ON THE AGRARIAN BUSINESS IN UKRAINE

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Over the last few decades, humanity has faced a growing number of natural disasters. The world is experiencing a steady rise in air temperature, and the previous five years are recognized as the hottest in the history of meteorological observations. Global climate change has become a global problem. Most scientists acknowledge the existence of climate change on the planet, and the fact of global warming is considered scientifically proven. More and more often in the world, there are abnormal weather phenomena (showers, floods, tsunamis, tornadoes, hurricanes, earthquakes, etc.), the global air temperature is constantly rising, the ozone layer is decreasing, the level of the world's oceans is increasing. Weather, which is the most important factor influencing crop formation, is changing.

Thus, global climate change poses many threats to agricultural producers that affect key agricultural indicators. Decreased productivity of agricultural production and the overall productivity of crops lead to lower agricultural business incomes and loss of production stability (*Strategy*, 2019).

There are many versions and forecasts on the impact of climate change on agriculture: the development of crops will accelerate; the yield of the main types of crops will increase (decrease); sown areas will be reduced (expanded); increase (decrease) the efficiency of fertilizer application, etc. (Stepanenko, 2015).

Ukrainian agricultural producers are significantly feeling the consequences of climate change. The favorable temperate climate in our latitudes is changing significantly - it is becoming drier throughout Ukraine. According to the FAO (Food and Agriculture Organization), over the past 19 years, air temperature in Ukraine has risen by almost 1 ° C (average annual temperature increase in 2000 was 1.42 ° C, and in 2019 –by 2.37 ° C higher than in 1951–1980) (FAO, 2020, p.350). Climatic zones have shifted by almost 200 km (in the Kherson oblast there is a subtropical zone, and the Polissya zone has practically disappeared). In the last decade, there has been a declining trend in rainfall, causing droughts even in areas where they have never been observed before (*Climate*, 2020). Abnormal heat in summer, winters without snow, significant differences between day and night temperatures, very heavy showers with hail and gusts of wind, floods, fires, etc., which cause additional damage, are not typical for our latitudes.

Thus, due to the drought in 2020, about 400 thousand hectares of winter crops were lost in Ukraine (*The analysis*, 2020). According to the press center of the Ministry of Development of Economy, Trade and Agriculture of Ukraine, Ukrainian farmers in 2020 harvested 65.4 million tons of grain, which is 7 million tons less

than in 2019. There is a reduction in crop yields throughout Ukraine (*Harvest*, 2020). Adverse conditions most affected the yield of grain and legumes in Kherson, Dnipropetrovsk, Kirovohrad, Zaporizhzhia, and Mykolaiv oblasts (2.68–3.45 tons per hectare). The worst situation is in the Odesa oblast (1.85 tons per hectare) (*Named*, 2020). The lowest yields of major crops were collected in Volyn, Rivne, Ivano-Frankivsk, and Chernivtsi oblasts (0.84–1.68 million tons). The worst situation is in the Zakarpattia oblast (0.40 million tons) (*Harvest*, 2020).

It should be noted the positive effects of climate change on agriculture in Ukraine. Thus, it has been established that an increase in air temperature by 2–2.5 °C in our territory will increase the yield of many crops (*Climate*, 2020). Currently, Ukraine is already extending the active growing season by ten days or more. This opens up additional opportunities for agricultural producers to grow new heat-loving varieties of crops. When conducting agribusiness, it should also be taken into account that the winter period has been reduced by almost a month. This creates the conditions for the early sowing of individual crops (*Climate*, 2020). Accordingly, if you choose the right crops, it is possible, under irrigation, to grow two crops of some crops, especially in the southern regions of Ukraine.

Thus, agribusiness owners need to implement changes in land use and changes in business management. The most excellent effect will be achieved if the main types of changes in land use will be: changes in the cultivated area, types of crops, and places of their sowing (Parry, 2019).

Agricultural production, from a business point of view, can be considered as ecosystem management (Melnichenko, 2019; Косик, 2011; Чигрин, Пимоненко, 2011; Sotnyk, Shvets, Momotiuk, & Chortok, 2018). The need to attract investment for effective business is proven in the research of modern scientists (Bhowmik, 2020; Chygryn, Krasniak, 2015; Чигрин, Мельник, Дегтярьова, Шкарупа, 2014; Sokolov, Mykhailov, Khandurin., 2018; Чигрин, Івахненко, 2020; Masharsky, Azarenkova, Oryekhova, & Yavorsky, 2018; Pavlyk, 2020; Pimonenko, Lyulyov, Chygryn, 2018; Yelnikova, Barhaq, 2020). It should be borne in mind that in today's world, preference is given to environmentally friendly business (Andreas Karaoulanis, Vasiliki, 2018; Brimah, Rabiou, Bamidele, & Sheu, 2020; Chygryn, 2017; Dkhili, 2018; Ivakhnenko, 2020; Rabiou, Olanipekun, Bamidele, & Awe, 2020; Rakotoarisoa, Kaitibie, 2019; Singh, 2019; Tovmasyan, Avetisyan, Galustyan, Tatosyan, Mirijanyan, & Rushanyan, 2020; Toyin, Oludayol 2020).

Thus, agribusiness owners need to rethink their farming strategies (Kaya, 2020; Pięta, 2018; Popoola, Samaila, & Lawal Kamaldeen, 2019; Potapenko, Kornatovskyy, & Shylkina, 2017; Sadiq, 2020) to turn the negative effects of climate change into benefits. To maintain their business and increase its efficiency, agrarian must, above all, adapt their crops to climate change. To do this, they need:

- to choose more heat-loving and drought-resistant varieties of crops for crops, taking into account the length of their growing season;

- apply in production, if necessary, drip irrigation and mulching;
- switch to new types of plowing that retain moisture in the soil;
- to prevent liquid moisture in the soil to use liquid fertilizers;
- considering that warm winters help to increase pest populations, take timely measures to control them, etc.

Agricultural business owners should follow the rule "land should not be left bare." To do this, they need to change outdated approaches to crop rotation to the latest technologies for growing crops. For example, after harvesting the main crops, to preserve nutrients in the soil, grow low-growing plants (perennial grasses and legumes), which also inhibit the growth of weeds and loosen the soil, and reduce soil erosion to use radish crops or mustard. Using environmentally-oriented approaches in the process of crop production, crop producers have the opportunity to adapt to new realities and turn adverse climate change into their advantages, which will effectively use available land resources and promote agricultural development in Ukraine.

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