



The One Health concept: a comprehensive approach to the function of a sustainable food system

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ABSTRACT

The modern world faces the challenge of rapid economic/industrial development being based on the irrational use of natural resources. Likewise, the technical-technological and civilizational progress that humanity has achieved, accompanied by the increase in the human population, has led to environmental damage, affecting climate change, intensifying global warming and causing environmental pollution. There is no doubt that due to socio-economic, political, health and environmental dimensions of sustainability, these processes are unsustainable in the long term. Moreover, if the world continues to use natural resources in accordance with the existing economic and demographic projections, by 2050, we would need three times the capacity of the Earth in terms of natural resources including energy. The Sustainable Development Goals (SDGs) are an important policy initiative, based on using clean and innovative technologies in a socially responsible manner that ensures poverty reduction, sustainable use of terrestrial ecosystems, ensures healthy life, and promotes well-being as a whole, accompanied by reduction of environmental pollution, proactive approach in the prevention of new sources and types of pollution and the protection of biodiversity. This review examines sustainable development aspects of importance from a One Health perspective, focusing on Serbia.

1. Sustainable development concept and significance

As a result of global, intensive efforts over the last decade, to apply the positive transformation of modern society, a UN Summit in New York on 25–27 September 2015 launched the resolution (A/RES/70/1) — Transforming our world: the 2030 Agenda for Sustainable Development (UN, 2015). Sustainable development has been defined in many ways, but the most frequently quoted definition is from The International Institute for Sustainable Development (IISD), which has defined this concept

as a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (IISD, 2022). The Sustainable Development Goals (SDGs) are a very complex and important policy initiative that cover harmonization, balance and synergy of three dimensions of human life:

- ecological — protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change mitigation and adaptation,

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- economic — economic, social and technological progress occurs in harmony with nature,
- social — end poverty and hunger in all their forms and dimensions, and ensure that all humans can fulfil their potential in dignity and equality and a healthy environment.

Each country commits to urgently mobilize all resources so that the 17 SDGs and 169 targets are achieved by 2030 and thereby shift the world onto a sustainable and resilient path.

Food security, as a prerequisite for the prevention of hunger and malnutrition, is a matter of priority of the Agenda for Sustainable Development 2030 (COR 2), aimed at protecting people's health and ensuring global economic development (Linda *et al.* 2020). Alongside continuing development priorities, food safety and security are integrated and indivisible with many of the SDGs, especially ending hunger and poverty (SDG 1 and 2) and promoting good health and well-being (SDG 3) (FAO, 2018; Veldhuizen *et al.* 2020).

The food system and sustainable nutrition are affected by several factors which interact: loss of biodiversity and deforestation, climate change, intensification of industrial production, natural resource scarcity, waste generation, the lack of fresh water and (renewable) resources, the trend of human population growth that requires ever-increasing amounts of food, nutrition-related diseases, social and economic inequalities and war conflicts (Willett *et al.* 2019) (Fig. 1). According to the World Economic Forum's Davos 2023 Global Risks Report, climate change remains the greatest long-term threat facing humanity. Climate change is one of the greatest challenges of our time, and its adverse impacts undermine the ability of all countries to achieve sustainable development. In addition, it generates new hazards and challenges not only in the least developed countries as was considered previously, but also at the global level. The Intergovernmental Panel on Climate Change released a report (IPCC, 2022) stating that the effects of climate change are present on all continents and in all oceans. According to a report by the Republic Hydrometeorological Service of Serbia, 15 of the 20 hottest years in Serbia were registered after 2000 (period 1951–2019) (RHSS, 2022). To avoid the most severe consequences for the ecosystem, the UN member states adopted the Paris Agreement (UNFCCC, 2015) to work on reducing greenhouse gas emissions. The Paris Agreement is the main framework for international cooperation in the fight against climate change and aims to keep the increase in the global average tem-

perature well below 2°C above pre-industrial levels and for the signatory countries to continue their efforts to limit the increase to 1.5°C.

In addition to being an ecological problem, due to extreme weather conditions and natural disasters, climate change directly and/or indirectly negatively affects land and ocean ecosystems, water reserves and human habitats, and thus agriculture and human and animal health (Dorward and Gille, 2022). According to the World Bank data from 2016, the agriculture sector, including crop production and horticulture, covers almost 40% of the land area. Abiotic factors, such as air pollution, nutrient deficiencies and extreme temperatures, will affect soil quality, plant health and crop productivity. On the other hand, the impact of climate change will also be significant on the biotic factors of the environment, that is, on the spread of insects, rodents, plant pests and other vectors of infectious diseases common to humans and animals (zoonoses). If the implementation of good agricultural and good production practices does not meet the set goals, we can expect increased use of pesticides and other chemicals against plant pests (Lam *et al.* 2021). Therefore, the issue of real concern to human health due to the intake of low, but still toxic concentrations of pesticides and mycotoxins through food is raised (Milićević *et al.* 2020). The importance of the safety of animal feed should not be underestimated, as feed contaminated by environmental contaminants (toxic elements, pesticides, polycyclic aromatic hydrocarbons (PAHs) and persistent organic pollutants (POPs)) jeopardizes the food chain and directly affects the presence of residues in food of animal origin (Smulders *et al.* 2019).

2. European Green Deal

The European Green Deal (EU, 2020a) is a direct response to the EU Agenda for Sustainable Development 2030. The European Green Deal sets out how to make Europe the first climate-neutral continent by 2050. It maps a new, sustainable and inclusive growth strategy to boost the economy, including construction, energy, transport, agriculture and food production, improve people's health and quality of life, care for nature and leave no one behind. This strategy presents the circular economy as one of the central elements for different use of raw materials, energy efficiency and substantial changes along the whole value and supply chains in the economy. In addition, it conceptualizes resource independence and resilience and keeps policy objec-

tives linked to sustainable consumption and production. Finally, the new set of policies directly related to the Green Deal also include potential trade barriers for countries that are not actively working to reduce greenhouse gas emissions.

Just one year after the adoption of this EU strategic document, the Green Agenda for the Western Balkans was also adopted in 2020, as a document that provides a strategic direction for the restructuring of economies in the region to make them compatible with the economies and societies of the EU, to which the Western Balkans converge. All these central pillars of the EU Green Deal are also incorporated into the Green Agenda for the Western Balkans.

3. Circular economy

The circular economy is a relatively new paradigm, an instrument for the realization of SDGs to replace the linear economy model, which in modern business conditions is unsustainable due to limited resources, accumulation of waste, inadequate waste management and damage to the environment (*World Resources Institute*, 2019). In the circular economy, products are produced, designed and used in a way that requires less use of natural resources, eliminating waste and pollution (landfills), more efficient

management of waste as a raw material (recycling) and reduction of pollution to a minimum. Applied together, these principles can help tackle the environment and provide a better standard of living population (EU, 2020). We deem it relevant to underline that the circular economy as such, or some of its elements including, for example, carbon accounting, have become part of a regular university curricula in many countries both in the Global North and the Global South. Therefore, we are pleading for reconsideration to incorporate elements of the circular economy in the regular curricula within the whole spectrum of faculties at universities in Serbia.

Because of the expected global population growth, (8.5 billion by 2030 and 9.7 billion by 2050), an increase in production is expected from agriculture and the food industry, which will be one of the major drivers for the future consequences for the environment (*Petrovic et al.* 2015; *Petrovic et al.* 2017). The direct links between natural resources and the production processes make food systems a sector of particular importance to adopting the circular economy model, which should enable better use of resources without negative effects on biodiversity and the environment. The circular economy presents a great challenge for every national economy because it synthesizes strategies and innovative busi-

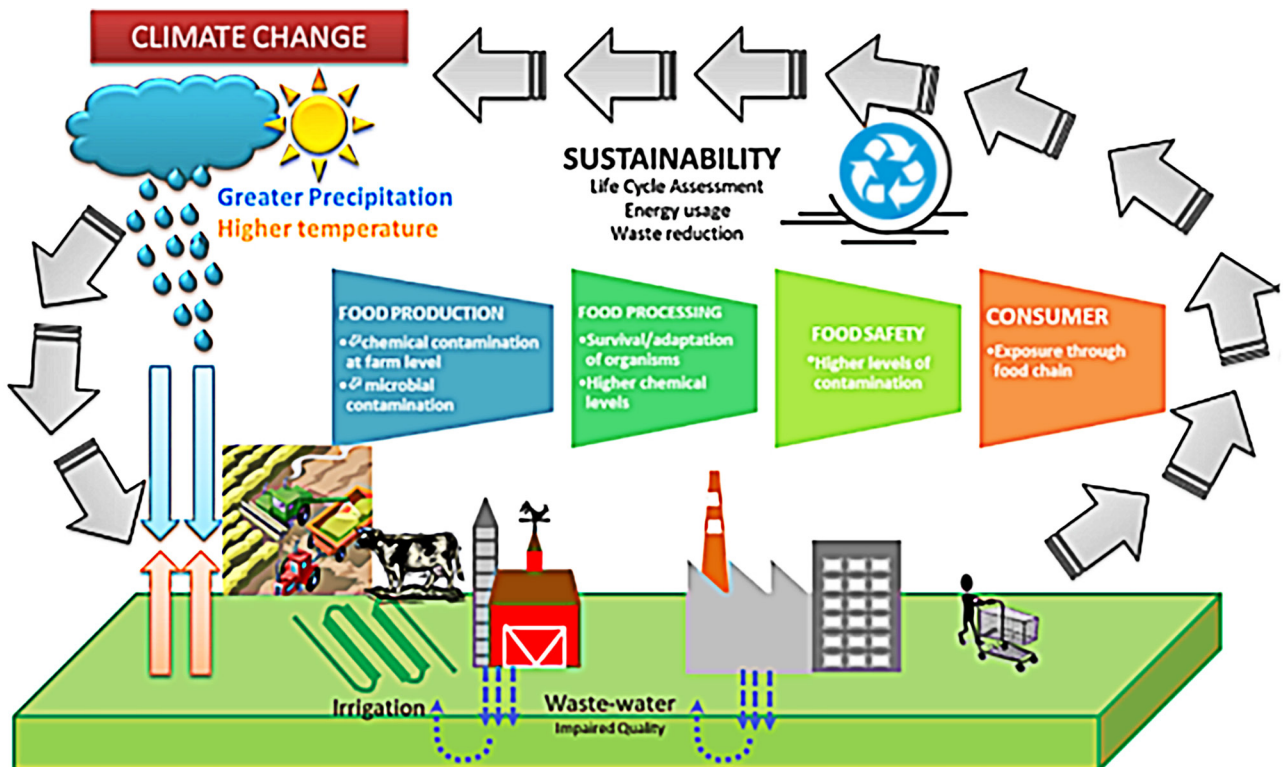


Figure 1. Illustration of climate change and food system interactions (Adopted by *Jeanne-Marie Membre*, 2022)

ness models. In the process of joining the EU, Serbia adopted the National Sustainable Development Strategy for the period from 2008 to 2017, as well as the Industrial Policy Strategy for the period 2021 to 2030, which also emphasizes the necessity of introducing the principles of the circular economy. The two strategies provide guidelines for further action in the area of sustainable development and new alternative strategies through the circular-green economy. The government of Serbia has recently adopted two documents that support this strategic commitment — the Program of Cooperation between the Ministry of the Economy and the Centre for Circular Economy within the Chamber of Commerce and Industry of Serbia; the Program for Circular Economy adopted in December 2022 by the Ministry for Environmental Protection. It must be pointed out that both these programs explicitly underline the urgent need for development of new academic programs and adaptation of existing university curricula.

4. The farm-to-fork strategy

Agriculture not only provides food and other raw materials but acts as the backbone of rural development, a sector of the economy that, with its multifunctional roles (economic, ecological, cultural and sociological), maintains the stability of society as a whole. The strategy from field to table, derived from the Common Agricultural Policy of the EU, is an innovative new strategy for the sustainability of the food system in the EU (EC, 2020b), which, along with the circular economy model and the biodiversity strategy, represent the very heart of the Green Deal. It comprehensively responds to the challenges of a sustainable food and nutrition chain and will enable the transition to a sustainable food system that guarantees food security and access to healthy foods originating from a healthy planet. This strategy will reduce the ecological and climatic footprint of the food system in EU countries and strengthen its resilience, protect the health of citizens, and ensure the continued operation of entities in the food system. The strategy includes specific goals for the transformation of the EU food system, including reducing the risks linked to pesticides by 50%, reducing the use of fertilizers by at least 20% by 2030, and reducing overall EU sales of antimicrobials for farmed animals and aquaculture by 50% by 2030. This approach will help to reach the objective of at least 25% of the EU's agricultural land under organic farming by 2030, and thus, to a significant increase in the share of organic produc-

tion. The strategy also proposes ambitious measures to ensure that a healthy choice is also the best choice for EU citizens, which implies harmonized mandatory front-of-pack nutrition labelling so that consumers are better informed about food products.

5. One Health concept

The outset of the 21st century was characterized by the emergence of several pandemics caused by new zoonotic viruses such as severe acute respiratory syndrome (SARS), highly pathogenic avian influenza (HPAI), H5N1, pandemic H1N1, Zika and Ebola. These pandemics revealed how the health and economic systems of even developed countries can be affected and modulated by infectious diseases, pointing to the weaknesses of their healthcare concept and supply chain management (AL-Eitan *et al.* 2023). On the other hand, when evaluating the sustainability of the food chain from the perspective of consumers, all components of a sustainable food system must be taken into account. The World Trade Organization allows member countries to ban import of products from countries or companies found to be violating animal welfare standards, on the grounds of public morality. Surprisingly, food fraud, especially during the pandemic, has increased dramatically, and thus, trade chains are allowed to upgrade elements of private standards (GlobalG.A.P, FSSC 22000, BRC, IFC) to improve the market chain of agri-food products and strengthen consumer confidence. Guarantees are needed that food coming from farms is healthy, produced with sustainable production methods, with minimal impact on the environment and with a responsible approach to worker safety and animal welfare (Bittisnich, 2023).

The One Health concept is a joint tripartite collaborative idea from the FAO, WHO and WOA (previously OIE) and implies cooperation, coordination and communication, across all relevant sectors and disciplines, with the ultimate goal of achieving optimal health outcomes for people, animals and the environment (FAO, OIE, WHO, 2019).

Areas of action of the One Health concept include:

- Control of zoonoses,
- Food safety,
- Action plan against antimicrobial resistance,
- Environmental protection

The One Health approach was primarily launched due to reduce risks of existing and potentially re-emerging infectious diseases transmissi-

ble between animals and humans, and it has been proven to be visionary in reducing pandemic risks. In addition, this approach has shown the importance of a coordinated, multisectoral approach in the prevention and control of other threats that arise as a result of the interaction of humans, animals and the environment (Milićević and Pleadin, 2022). Taking into account the processes of globalization and increasingly pronounced climate changes, as well as new trends in food safety and security, innovative solutions and stronger integration of all participants in the food chain will be required. Therefore, the concept of One Health is necessary as the only choice and answer to existing and future challenges related to the sustaina-

ble development of the food system (Milićević and Nedeljković-Trailović, 2021).

6. Conclusion

The concept of sustainable development was built from the need for economic growth to be based on clean and innovative technologies with socially responsible businesses that ensure poverty reduction, long-term better use of resources, improvement of health conditions and quality of life, accompanied by reduction of environmental pollution. Proactive approaches such as One Health in the prevention of new sources and types of pollution and in the preservation of biodiversity are in line with SDGs.

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