

**TOWARDS SUSTAINABLE FOOD SYSTEMS
NATIONAL PATHWAY OF TURKEY**



October 2021

FORWARD

The population of 7.8 billion is estimated to reach nearly 10 billion people by 2050, according to UN sources. Every year, approximately 931 million tons of food is wasted at the global level, in other words, it goes to waste. This means that 17% of global food production could go to waste, of which 61% comes from the domestic sector, 26% from the food service and 13% from the retail sector. According to UN sources, 8-10% of global carbon emissions are related to unconsumed food. The COVID-19 pandemic is estimated to have pushed an additional 83-132 million into chronic hunger in 2020. At the same time, fourteen percent of the food we do manage to produce is lost and even more wasted. Child stunting remains high as well. In 2019, over 21 percent (144 million) of children under 5 years of age were stunted. Child overweight is also not improving, with about 38 million, or 5.6 percent, of children being overweight. Changes in diet and increasing demand for food of animal origin put a growing burden on all-natural resources, including valuable farmland. Animal husbandry crucial for healthy nutrition produces higher greenhouse emission and its possible impacts on the environment. The trade-off situation needs to be lessened.

One of the commitments of Turkey will be reduction of food loss and waste, and Turkey remains committed to addressing food loss and waste as part of the country's ambition to have fair and healthy food for all its population by 2030. Furthermore, Turkey will continue the implementation of School Nutrition and School Food Programs since feeding the next generation with nutritious food will play a vital role in the sustainable food systems.

Moreover, Turkey preserve its commitment to perform actions and main actions as a result of 3rd Agriculture and Forestry Council in line with the Summit given in Appendix 3. Turkey also committed to perform actions and main actions as a result of the Water Council in line with the Summit given in Appendix 4. Turkey also commits to differentiate the diets in order to lessen the malnutrition along with the other ones. Turkey's priorities take place in following

- Protection and Sustainable Use of Environment and Natural Resources
- Transition to Sustainable Consumption and Prevention of Food Loss and Waste
- Food Security
- Public Health and Food Safety
- Inclusive Sustainable Food Systems and Poverty Alleviation
- Increasing the Resilience of Sustainable Food Systems Against Food Crises

National Pathway of Turkey for Food Systems addresses how the food systems are expected to be transformed to provide healthy diets for all, mitigating climate change, protecting the biodiversity, improving the food chain by protecting small holders in a sustainable way.

ABBREVIATIONS

ASELSAN: Military Electronic Industries

BCSD Turkey: Business Council for Sustainable Development Turkey (BCSD Turkey)

BSEC: Black Sea Economic Cooperation Organization

BSGM: General Directorate of Fisheries and Aquaculture

COMCEC: The Standing Committee for Economic and Commercial Cooperation of the Organization of the Islamic Cooperation

Da.: Decare

FADN: Farm Accountancy Data Network

FAO: United Nations Food and Agriculture Organization

FAO-SEC: FAO-Central Asia Sub-Regional Office

FLW: Food Loss and Waste

FTPP: FAO-Turkey Partnership Programme on Food and Agriculture

FTFP: FAO-Turkey Forestry Partnership Programme

GDP: Gross Domestic Product

GIS: Geographic Information System

Ha. Hectare

HoReCa: Hotel, Restaurant, Cafe

IFAD: The International Fund for Agricultural Development

IACS: Islamic Organization for Food Security of the Organization of Islamic Cooperation

IEG: International Energy Agency

IOFS: Islamic Organization for Food Security

LPIS: Land Parcel Identification System

LULUCF: Land Use, Land Use Change and Forestry

MoAF: The Ministry of Agriculture and Forestry

MoENR: The Ministry of Energy and Natural Resources

MoFSS: The Ministry of Family and Social Services

MoH: The Ministry of Health

NASA: National Aeronautics and Space Administration

NCCAP: National Climate Change Action Plan

NGO: Non-Governmental Organization

SDGs: Sustainable Development Goals

PPSs: Purchasing Power Parities

SMEs: Small and Medium Enterprises

SWAP: Sectoral Water Allocation Planning (SWAP)

TİKA: Turkey, Turkish Cooperation and Coordination Agency

TURKSTAT: Turkish Statistic Institute

UN: United Nations

UNEP: United Nations Environment Programme

UNFSS: United Nations Food System Summit

WHO: World Health Organization

WWF: World Wildlife Fund

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EXECUTIVE SUMMARY

UN Secretary-General will convene a Food Systems Summit so as to maximize the co-benefits of a food systems approach across the entire 2030 Agenda. The summit aims to provide a platform for ambitious new actions including innovative solutions on food systems from countries. The objectives of the Summit are as follow;

- Raise awareness of food systems' centrality to the entire sustainable development agenda, and the urgency of transforming food systems, particularly in the wake of a global pandemic;
- Align stakeholders around a common understanding and narrative of a food system framework as a foundation for concerted action, making food and food systems a more widespread issue for advocacy and action to achieve the 2030 Agenda;
- Recognize the need for inclusivity and innovation in food systems governance and action;
- Motivate and empower stakeholders who support food systems transformation through the development of improved tools, measurement, and analysis; and
- Catalyse, accelerate, and enlarge bold action for the transformation of food systems by all communities, including countries, cities, companies, civil society, citizens, and food producers.

In the framework of the Food Systems Summit, 5 main action tracks have been identified. These are;

Action Track 1 (AT1): Ensure Access to Safe and Nutritious Food for All

Action Track 2 (AT2): Shift to Sustainable Consumption Pattern

Action Track 3 (AT3): Boost Nature Positive Production at sufficient scale

Action Track 4 (AT4): Advance Equitable Livelihoods

Action Track 5 (AT5): Build Resilience to Vulnerabilities, Shocks & Stresses

Among these actions, Turkey has made a significant contribution for the Action Track 2 and 5 at global level. However, a national dialog process is conducted for all five action tracks in Turkey. In 2019, a country sustainable food system report was prepared by the Ministry of Agriculture and Forestry in consultation with stakeholders from public, private, universities, NGOs. and the disadvantaged groups, particularly women and youth. The current situation and the elements of sustainable food systems were reflected in this report. Also, a final report including the main problems and solutions in sustainable food systems was prepared.

The national preparation process for the UN 2021 Food Systems Summit was carried out with a participatory approach under the coordination of Aylin ÇAĞLAYAN ÖZCAN, General Director of General Directorate of European Union and Foreign Relations at the Ministry of Agriculture and Forestry. She was designated as the National Dialogues Convenor on behalf of Turkey. In this context, the dialogue process, which was planned in three stages as member country dialogues, global dialogues and independent dialogues, was conducted between November 2020 and September 2021. This national pathway is prepared on the basis of the

outputs of all the dialog processes in accordance with Turkey's national strategy and policies in relation to food system components.

INTRODUCTION

A food system is defined by WWF (2018) as a system covering the activities that relate to production, processing, transport, and consumption, and grasping all the elements of environment, people, inputs, processes, infrastructure, institutions, markets and trade and consumption of food and outputs of these activities covering socio-economic and environmental outcomes.

A growing population, food loss and waste, climate change, changing consumer patterns as a result of changing socio-economic conditions create a threat for food systems. In spite of the fact that the world produces sufficient food for all people, 840 million people go hungry according to estimations for 2030 and 2 billion are malnourished because of the lack of a perfect food system in the world. While the population increases exponentially, the average size of agricultural holdings is expected to decrease. So, there is a need to increase environmentally friendly production at sufficient scale in the next decade.

Total utilized agricultural land including permanent meadows and pastures is 37,762,000 hectares of which 41.4 % consists of area of cereals and crop products. The rate of area of fruits, beverage and spice crops has increased by 36.4 % in the years of 2001-2020 though sown areas for cereals decreased to 12.8 % in the same years. Primary agriculture accounts for 6,7 % of GDP and employs 16 % of the workforce.

Regarding agricultural producers' status, there are 2,306,305 farmers according to the farmers register system and 82,6 % of the Agricultural holdings are under 100 da. in Turkey. The number of agricultural holdings over 200 da. is only 6,4 %.

Small scale farmers, particularly fruit and vegetable producers as well as fish producers, have difficulty to access the market since their products are perishable. So, cooperative marketing seems one of the most effective ways for those groups to handle marketing problems and provide a livelihood. The number of members of cooperatives is 3.5 million. The fact that there is a significant number of cooperative members in Turkey, there is still some room to progress regarding the institutional capacity of agricultural cooperatives.

There is a rapid migration from rural areas to urban areas in Turkey. The rate of urbanization is over 75 % and is expected to be over 80 % in the next decade. There is thus a shift from producer society to urban society. The characteristics of labour force are intensively affected by population dynamics in rural areas. Because of rural urban migration and decreasing birth rates, the average age of farmers is increasing constantly in Turkey which necessitate the adaptation of food and production systems to the changing profile and capabilities of the farmers.

With respect to migration, Turkey hosts around 45 percent of all Syrian refugees in the region due to the regional instability. Providing viable livelihood opportunities in agriculture to cope

with the crises is one of the key elements of the Syrian Refugee Resilience Plan prepared by FAO, covering 2019-2020.

According to the Food Security Index, Turkey is a strong country regarding proportion of population under the global poverty line, sufficiency of supply, micro-nutrient availability, market access and agricultural financial services, food safety, protein quality and food safety net programs. Turkey is self-sufficient in many crops and fruit and vegetables. However, the losses in harvest and post-harvest are so high. The most important harvest losses are seen in tea with 15% and wheat with 5,1%.

The Waste Report prepared by the Ministry of Trade stated that 5.4% of the consumers throw away the leftover food and 23% of the purchased food is thrown away without being consumed. In order to reduce food loss and waste “SAVE YOUR FOOD” campaign was launched under the Ministry of Agriculture and Forestry in cooperation with FAO.

According to FAO statistics, average protein supply in Turkey increased to 109.3 g/capita/day in the period of 2016-2018 from 103.7 g/capita/day in the period of 2000-2002. Average supply of protein of animal origin significantly increased to 37.7 g/capita/day in 2016-2018 from 24.3 g/capita/day in the period of 2000-2002.

Changes in diet and increasing demand for food of animal origin put a growing burden on all-natural resources, including valuable farmlands. From the perspective of achieving Sustainable Development Goals by 2030, malnutrition and obesity is also an important problem that should be addressed. In this sense, the countries need to take action to address nutrition concerns, emphasizing the importance of a balanced diet in particular for women and children. They also have to tackle these challenges for the healthy future of people, communities and nations in terms of socio-political aspects. One of the main health problems in Turkey which are related to malnutrition detected in research, are protein-energy malnutrition in children, prevalence of obesity among adults and children. Excessive use of salt, lack of vitamins of B1, B2, B6 and D and also some minerals such as calcium, magnesium, iron, zinc and potassium are main causes of nutritious related health problems.

Global food systems need transformation; this shouldn't disregard the importance of innovation, which will help transform agri-food systems at this juncture. Turkey is one of the countries which is negatively affected by climate change in the Eastern Mediterranean basin. The country is, on one hand, under the threat of desertification and drought due to its climatic characteristics and topographic structure. On the other hand, some regions of it are under pressure from floods and forest-fires. In addition to the fact that 65% of Turkish soils are arid and semi-arid and sensitive to erosion, the increasing demand and pressure of growing population for natural resources are among the most important causes of desertification/land degradation.

The share of water abstraction and the use of groundwater in the agriculture sector is too high. The National Water Plan also emphasized how to protect the quality and quantity of groundwater. The rate of drip irrigation which is more efficient than surface irrigation needs to be increased. 11th The National Development plan also targets to increase the irrigated land until 2023 with an increase of 2 million hectares.

Major agricultural elements causing emissions in the agricultural sector are enteric fermentation, manure management and agricultural soils which account for more than 95% of the emissions.

The afforested land in Turkey increased to 22.6 million hectares in the years of 2002-2019 with a percentage of 8.7 and is planned to increase to 23.4 million hectares in 2023. Turkey is located in a region sensitive to forest fires and thus has experienced quite serious forest fires recently. Turkey prioritizes the works for reducing deforestation and forest damage with use of high technology.

With respect to pesticide use, in the last two years, the total pesticide use decreased by 11 %. The most commonly used pesticides are fungicides, herbicides and insecticides. Total pesticide use decreased to 53,672 tonnes with a percentage of 11 % from 60,020 tonnes in 2018. Turkey is in a better position in the use of pesticides than many developed countries.

The UN has launched a dialogue process so as to achieve 17 sustainable development goals by 2030. In order to realize it, the countries are invited to prepare their own national pathways under sustainable food system and make a considerable commitment for five action tracks;

Action Track 1 : Ensure Access to Safe and Nutritious Food for All

Action Track 2 : Shift to Sustainable Consumption Pattern

Action Track 3 : Boost Nature Positive Production at sufficient scale

Action Track 4 : Advance Equitable Livelihoods

Action Track 5 : Build Resilience to Vulnerabilities, Shocks & Stresses

Turkey is one of the foremost countries to initiate the process of transformation of food systems by preparing a country report on food systems in 2019.

In 2019, Turkey gathered the 3rd Agriculture Forestry Council, which consisted of 21 working groups which cover all elements of the sustainable food system, comprising more than 1300 participants from academia, NGOs, professional associations, public and private sector. 30K ideas and opinions across Turkey were gathered. As a result of the Council, Final Declaration (60 main points) with the concrete commitments has been announced to the public by President of Republic of Turkey, Recep Tayyip ERDOĞAN and after that 46 main actions were determined to implement. Solutions and projects to shed light on the future of Turkey continue to be implemented building common mind for the improvement of Food Systems.

Accordingly, Turkey will undertake actions and sub-actions until the end of 2023. Some of the actions are; the establishment of a digital value chain from seed to fork, the creation and implementation of an alternative support model with contracted production, the prevention of misinformation in food and increasing food literacy, the creation of the infrastructure for food loss and waste, and the enactment of a water law and established a monitoring and evaluation system for their implementation. Turkey will convene the next Agriculture Council in 2024.

As indicated in the National Rural Development Strategy of Turkey for the period of 2021-23, small-sized enterprises will be developed, agricultural productivity will be increased, quality of life will be improved and human and social capital will be strengthened in rural areas. The level of integration of these regions with the national market and other areas will be raised and

the quality of and the accessibility to education, health including improving the level of nutrition in food, communication and local government services will be improved. The rural workforce, especially women and young people, who have left their job in the agricultural sector but continue to reside in rural areas, will be directed to agricultural or non-agricultural production activities, by cooperating with other ministries, relevant institutions and organizations.

This national pathway document is presented to reveal Turkey's preparation and dedication for transformation of food systems in achieving the 2030 agenda. The national pathway aims to reflect the current food systems, to explore how food systems function, to what purpose they serve, to analyse if the food systems enable people particularly disadvantaged people. Which urgent actions need to be taken in the coming three years are also covered. How stakeholders can work for collective actions, the connection with the pathway and the other planning documents and the key milestones are also analysed to strengthen the implementation period.

The National Pathway will start with a summary of UN food systems, the second part will give a detailed current situation in Turkey. Action tracks and urgent challenges and needs for the food systems will be given in the third and fourth part. The fifth part will cover the key intervention areas. Actions in connection with Sustainable Development Goals are given in the sixth part. Seventh part covers the participatory approach. Reinforcing the pathway with other planning documents will be given in the eighth part. Ninth part will consist of monitoring and evaluation. The pathway will end with a short conclusion.

The Purpose of National Pathway

The United Nations (UN) will convene a Food Systems Summit in New York on September 23 in 2021 to strengthen the 2030 Agenda and Sustainable Development Goals. The purpose of the Summit is to: i) ensure access to safe and nutritious food, ii) increase sustainable consumption and production, and iii) build resilience against food security gaps.

The purpose of the National Pathway is to create sustainable, resilient and equitable food systems with concrete actions in order to make a significant contribution to the realization of the vision of the 2030 Agenda for Sustainable Development.

Methodology and Works Done

The methodology for derivation of the National Pathway includes various participatory approaches including stakeholder meetings, surveys, workshops in different regional levels as well as analyses conducted on national strategy and policy studies and literature review.

At the first stage, a fully-fledged dialogue roadmap for Turkey were prepared, and stakeholder analysis was made, with an aim to support transformation of the food systems through a more sustainable approach with the inclusion of respective stakeholders (with a gender sensitive and participatory approach) at regional, national and local levels, by taking into the account of the schedule determined by UN. Sustainable Food System Country Report-Turkey in English for COMCEC 34th Ministerial Meeting in 2019. In an effort to support national dialogues, the Report has been updated with inputs received from the ministerial departments and other

related ministries and CSOs. Furthermore, focal points, which were regularly informed and consulted on the dialogues when necessary, were determined from the public sector and NGOs. Moreover, some activities are planned with the aim of

- (i) Raising public awareness on sustainable food systems
- (ii) Ensuring better inclusivity of stakeholders of food sector value chain actors (i.e. primary producers, processors, marketers, food service companies, retailers) and especially those left behind and/or having the risk of being left behind (i.e. women, youngsters, small farmer holders, migrant workers etc.)
- (iii) Complementing/validating the results of the existing stakeholder analysis and improving the quality and content of the existing baseline report for public consultations on national sustainable and resilient food systems. Over 1300 stakeholders, the members of the 3rd Agriculture and Forestry Council were informed about the Summit via e-mail and requested them to fill out an online survey other than those of the public sector. Therefore, the national dialogue process respects specific aspects of the Principles of UNFSS.

Accordingly, the strategies and actions in the pathway are mainly based on the sustainable food system country report, two online surveys and the national workshop. Accordingly, on the one hand, the problematic-intervention areas, solution suggestions and action recommendations were received through online surveys and workshops. The first online workshop was carried out with participants who are members of Business Council for Sustainable Development Turkey (BCSD Turkey) including a workshop with 5 members. The second survey was conducted mainly with the public sector and the members of the Agriculture Forestry Council. A workshop covering a small group and a national workshop covering a larger group were organized to assess the results of surveys and gather comments and innovative suggestions regarding transformation of the food systems. It has been adopted as a principle that the entire dialogue process should be carried out with a participatory approach and be inclusive. All actors such as universities, NGOs and professional chambers are included as stakeholders and during the whole process, gender equality and disadvantaged groups were particularly considered.

3rd Agriculture Forestry Council was created in order to to implement, disseminate and develop new technologies, to determine the problems encountered in the services of agriculture and livestock sector and to find solutions with new technologies and to disseminate the know-how by using agricultural extension services in the formation of strategies for agricultural development and to take decisions that will help in the formation of strategies for agricultural development until 2024. The 3rd Agriculture Forestry Council was held from November 18-21, 2019 as a result of approximately four months' study, with a significant number of representatives from academia, non-governmental organizations, private sector, farmers, and experts from the Ministry of Agriculture and Forestry and other public institutions/organizations. Within the scope of the 3rd Agriculture Forest Council, 21 thematic working groups were formed with a total of more than 1300 participants and more than 30,000 ideas for the future of Turkish agriculture and forestry¹. The targets determined on the basis of the Commissions established within the Council were declared publicly by the President Recep Tayyip ERDOĞAN. Based on the results of the 3rd Agriculture Forestry Council, 46

¹ <http://www.tarimormansurasi.gov.tr/>

main actions and their sub-actions were determined to be implemented by the Ministry of Agriculture and Forestry at the beginning of 2020, and implementations of the actions are monitored quarterly until the end of 2023 and the results of the implementation are announced to the public annually. In this context, one of the most important inputs within the scope of the preparations for the Summit carried out at the national level is the outputs of the 3rd Agricultural Forest Council.

Regarding the first online survey, the questions covering the five-main action-tracks were sent to the members of BCSD Turkey via email. The online survey aimed to identify the problematic and intervention areas with the business leaders working actively in the food system of Turkey and the problematic-intervention areas, solution suggestions and actions were identified. 6 feedbacks were received for online questions. Also, a workshop was organized with members of the Sustainable Development Association of Turkey in order to discuss how the transformation of food systems is achieved in Turkey.

With respect to the second comprehensive online survey sent to the members of 3rd Agriculture Forestry Council. This survey was sent to over 1000 members of 3rd Agriculture Forestry Council from academia, public and private sectors, NGOs and CSOs and public institutions and NGOs etc. at the local and central level. 258 responses were received with over 500 problems and 1000 solutions and action recommendations to transform food systems. The analysis of results of both surveys were thus made through an encoding method and accordingly, the main challenges and actions were identified.

Additionally, a workshop was also organized with over 30 experts with the national sustainable food system focal points from MoAF and relevant ministries and other institutions, with the aim of discussing the current actions derived from online surveys and preparing the national pathway. All actions were reviewed and responsible and relevant institutions for each action were determined through this workshop. Also, new action suggestions were received from participants under each action track. A national workshop was organized by focusing a gap analysis from the previous studies. Approximately 140 stakeholders attended the virtual national workshop. After awareness raising opening speeches, participants were broken out into 5 discussion groups on the basis of 5 action tracks to discuss a thematic topic under each action track. After this national workshop, the outputs of the workshop and the previous findings were assessed and all these findings including literature review were integrated in this national pathway.

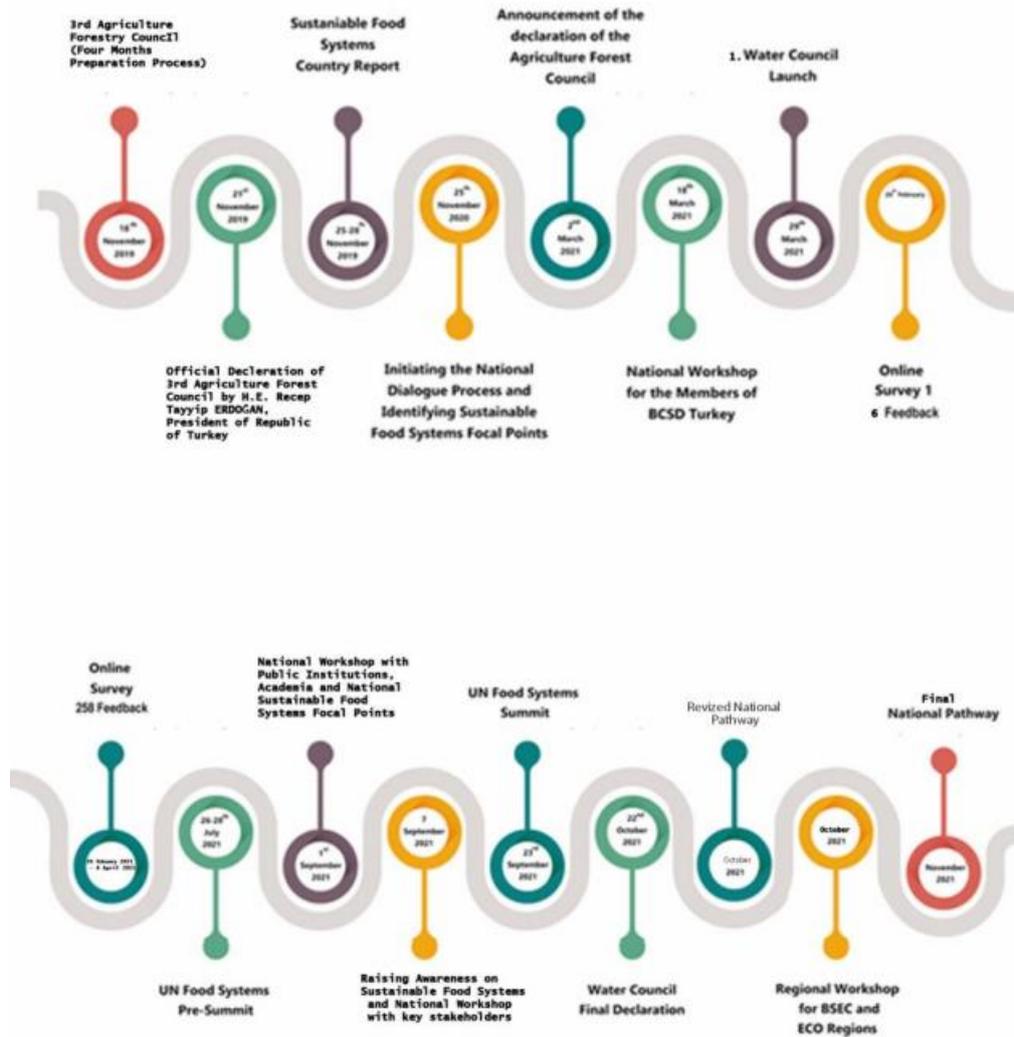


Figure 1. The Stages of National Pathway

The pathway process is shown in figure 1. The national pathway has been strengthened with the Water Council declaration, regional workshop and due to the dynamic nature of the process feedback from various stakeholders of the food system in Turkey.

To summarize, this national pathway aims to reflect the current food systems, to explore how food systems function, to what purpose they serve, to analyse if the food systems enable people particularly disadvantaged people. Which urgent actions need to be taken and priorities are also covered. How stakeholders can work for collective actions, the connection with the pathway and the other planning documents and the key milestones are also analysed.

1. FOOD SYSTEMS

A food system is defined by (WWF, 2018) as a system covering the activities that relate to production, processing, transport, and consumption, and grasping all the elements of environment, people, inputs, processes, infrastructure, institutions, markets and trade and consumption of food and outputs of these activities covering socio-economic and environmental outcomes. Not only does the food systems affect the human body, but they also have an important impact on the environment, economy and culture. According to the definition of FAO (2014), **a sustainable food system** delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised. A sustainable food system should thus ensure and contribute to all elements of environmental, social and economic sustainability.

The last pandemic, COVID 19, clearly shows that the world food systems are quite fragile and agricultural production is negatively affected by it. Greater resilience must be built into local and global food systems taking into consideration of COVID-19 pandemic's effects on the agri-food sector. Economic turbulences, climate change are one of the key drivers of food insecurity. When the supply chain does not work perfectly, the consumers, particularly vulnerable groups, cannot reach safe and adequate food.

In addition to that though Turkey, implements measures to combat COVID-19 and food safety and security problems aren't expected, agri-food sector has faced some challenges (such as production losses, lack of temporary labour, decreasing labour and farmer incomes and sales, fluctuating produce prices, high consumer food prices, import/export restrictions, changes in tariffs, marketing channels, customer attitudes, imports of agricultural imports). Structure of small-sized, subsistence and semi-subsistence farms are one of the bottlenecks of the sector and these ones need to be more supported in food crises times. Temporary lockdowns also negatively affected smallholders having difficulty to access markets, whose incomes mostly depend on district bazaars. Agricultural employment is also vulnerable to shocks. Many traditional retailers in Turkey harmonize their systems to online delivery due to COVID - 19.

Innovation is one of the tools to improve the bottlenecks in the food systems and digitalization of agriculture and food supply and delivery channels could be one of the useful tools in transformation of agri-food systems in Turkey. Food innovation can be defined as the development and commoditization of new food products, processes, and services. A weak food supply chain is one of the major challenges of the countries. So, developing new food ingredients and materials and articles intended to come into contact with food to increase nutritive value of the food and focusing on food quality through innovation and developing retailing and marketing strategies including artificial intelligence. Environmentally friendly production, improving safe food, preserving the natural resources and strengthening disadvantaged food system actors including small holders, women and youth are essential for transformation of food systems. In the next chapter, the current situation of food systems will be given in detail.

2. CURRENT SITUATION OF FOOD SYSTEMS IN TURKEY

It is estimated by FAO that the food production will have to increase by at least 50 % in order to meet demands of a growing and wealthier population with an increased meat demand. A growing population, food loss and waste, climate change, changing consumer patterns as a result of changing socio-economic conditions create a threat for food systems. According to the FAO SOFI Report (2021), it is estimated that between 720 and 811 million people in the world faced hunger in 2020 – 161 million more than in 2019. Nearly 2.37 billion people did not have access to adequate food in 2020 – an increase of 320 million people in just one year. No region of the world has been spared. The high cost of healthy diets and persistently high levels of poverty and income inequality continue to keep healthy diets out of reach for around 3 billion people in every region of the world. In spite of the fact that the world produces sufficient food for all people, 840 million people go hungry according to estimates for 2030.

Turkey has extensive resources of land and water and rare agro-ecological conditions with a total land area which is 769,630 km². Total utilized agricultural land including permanent meadows and pastures is 37,762 of which 41.4 % consists of area of cereals and crop products. The rate of area of fruits, beverage and spice crops has increased by 36.4 % in the years of 2001-2020 while sown areas for cereals decreased to 12.8 % in the same years.

The number of animals has also increased. With the EU negotiations, Turkish agricultural policies slightly shifted to EU agricultural policies. So outward-looking trade policies are adopted in the economy. Employment and the share of agriculture in GDP still maintains its substantial importance. Agriculture accounted for 6,7 percent in GDP. and 3,3 percent of exports. Agricultural employment consisted of 16 percent of total employment in 2020. Annual average yield in most of the crops increased exponentially. The statistics also show that consumption of major commodities are met from domestic sources. According to the World Bank, the rate of urban population was 75, 1 % in 2018 and is expected to exceed 82 percent by the year of 2050 in Turkey. Over 80 percent of total land fell into the 0-10 hectare group. More than 80 % of the farms are micro and small-scaled in Turkey. The less the size of agricultural holdings, the less farmers earn. Increasing productivity, diversifying the agricultural crops, improving the level of nutrition in food, improving production techniques and increasing women's role in production are among the targets of Turkish Agricultural policies. Agricultural cooperation is an important part of a sustainable agricultural system when considered by a significant number of small farmers in Turkey. Agricultural cooperatives are run as producer and irrigation unions, farmers associations and agricultural professional co-operation. However, agricultural cooperatives in Turkey need to be strengthened in technical and institutional capacity. A tailored-made approach to improve the structure of cooperatives needs to be developed. Apart from producer cooperatives, Agricultural Credit Cooperatives of Turkey with a central union and 17 Regional Unions, 1615 Cooperatives, 200 Service Bureaus, 19 Companies, approximately 10 thousand employees, TRY 35 billion total assets and more than 800 thousand members are the largest farmer organizations in Turkey.

Sum insured in the state supported agricultural insurance system (TARSİM) reached 83 billion TRY in 2020. Insurance penetration increases every year with the ever-expanding coverage of insurance policies.

In the last two decades, there has been an increase of 7.3 tonnes in cereal production. In the same years, the amounts of increase in oily seed and tomato have been 1,7 tonnes and 4,2 tonnes, respectively. Particularly, major tomato export comes from agricultural greenhouses.

Turkey has also a great potential of geothermal heat for greenhouses. It ranks first in Europe and 4th in the world with respect to geothermal energy. The amount produced in geothermal greenhouses is 4,344 decares (MoAF, 2020c). According to TURKSTAT, the amount of increase in greenhouse production in the last two decades has been more than 5 million tons. It is estimated that the productivity of products grown in these greenhouses is higher by 30 %. Turkey has increased its agricultural exports 4 times in recent years, with 1,690 kinds of products made to more than 190 countries. Turkey plays a vital role as one of the major exporters of hazelnut, cherry, fig, quince and apricot in the world.

According to the 2020 data of the Ministry of Agriculture and Forestry, the number of farmers engaged in organic plant production is 52,590; organic plant production area is 382,665 ha and organic plant production amount is 1,631,943 tons. In this context, since 2005, the number of farmers and production have increased approximately 3 times and the production area has increased 4 times.

With respect to animal production, there has been an increase of 300 thousand tons in red meat production, 12 million tons in milk production, 1.4 million tons in poultry meat production and 8.2 billion tons in egg production in the years of 2002-2020.

Turkey, with its natural conditions, agricultural structure and traditions, is a country suitable for widespread sheep and goat breeding. Ovine and goat breeding constitutes an important place in terms of animal husbandry in Turkey. Accordingly, Turkey with approximately 42.1 million head of sheep and 12.0 million head of goats (54,113,000 head in total) ranks first in Europe and is among the top 10 countries in the world.

Another sector in which Turkey is the most competitive is broiler and egg poultry. Turkey is among the top 11 countries in the world in terms of number of chickens; In Europe, it ranks 2nd in terms of production. In Turkey, approximately 1.5 million people including producers, farmers, tradesmen related to the sector, feed, pharmaceuticals, sub-industry, transportation, marketing earns a livelihood from the poultry sector, which is one of the fastest growing and strongest sectors in Turkish agriculture.

Turkey is located at the intersection of three different biogeographical regions: Euro-Siberian, Mediterranean and Iran-Turanian and is home to approximately 12,000 species of plant diversity, one third of which is endemic. Anatolia's unique geography ensures that plants bloom in different regions at different times of the year, making Turkey a suitable ecology for beekeeping. Turkey has the largest share in world pine honey production with a ratio of up to 90%.

According to FAO statistics, Turkey ranks second after China in terms of honey production in 2019. In addition, Turkey ranks the first in Europe with the number of colonies and honey production and ranks seventh in the world regarding consumption of honey (daily grams per capita).

According to TÜİK and BSGM statistical data, fisheries and aquaculture production decreased by 6.1% in 2020 compared to the previous year and amounted to 785,811 tons. Fisheries production in Turkey was 836,524 tons in 2020, with 44.8% sea fish, 6.8% other seafood, 3.8% inland fishery products and 53.6% aquaculture products. While the production by hunting was 463,168 tons, the aquaculture production was 293,175 tons.

In 2020, 293,175 tons of production by aquaculture took place in the seas and 128,263 tons in inland waters. The most important fish species grown were trout with 127,905 tons in inland waters, sea bass with 148,907 tons and sea bream with 109,749 in seas. Among the EU countries, Turkey ranks 5th in total fisheries production.

Turkey ranks 7th in the world in agricultural production. Turkey ranks number one in hazelnut, cherries, figs and apricot. It is not surprising that the Turkish food and beverage industry is one of the most attractive areas for foreign investors due to its strength in this area. Since 2010, approximately USD 89.5 billion of foreign direct investment has been made in the sector, as it offers profitable investment opportunities to global investors.

Turkey also has a rich ecological diversity. The afforested land in Turkey increased to 22.6 million hectares in the years of 2002-2019 with a percentage of 8.7 and it is planned to be increased to 23.4 million hectares in 2023.

Turkey is under the threat of desertification and drought due to its climatic characteristics and topographic structure. In addition to the fact that 65% of Turkish soils are arid and semi-arid and sensitive to erosion, the increasing demand and pressure of growing population for natural resources are among the most important causes of desertification/land degradation.

Table 1 points out the manufacturing of food and beverage products and animal production. The highest average incomes are in the manufacturing of beverage products while the highest number of paid workers are in the manufacturing of food products.

Table 1. Manufacturing of Agri-Food Products

Manufacturing of Agri-Food Products	Net Sales (TRY)	The Number of Workplaces (Unit)	The Number of Paid Workers	The average incomes (TRY)
Manufacturing of Food Products	334,010,000,000	51,974	463,725	3,393
Manufacturing of Beverage Products	17,282,612,278	753	15,706	5,074
Manufacturing Animal Production	27,502,055,124	6,828	34,313	3,189
Agriculture, Forestry and Aquaculture	72,453,142,737	16,493	95,574	3,148

Source: Entrepreneur Information System, 2021

The production value of aquaculture in 2020 was realized as TRY 10,859,149,557, of which TRY 8,586,263,409 was in sea water and TRY 2,272,886,148 was inland.

One of the major challenges of Turkish agriculture is the harvest and post-harvest losses. According to FAO statistics, losses of vegetables and fruit were estimated at 18 % and 11 %, respectively.

Population growth, rapid urbanisation and increasing per capita income has caused a faster expansion of food demand than agricultural supply, resulting in a shift in consumption patterns towards other animal products (poultry and fish) in Turkey.

As of the end of 2020, a total of 6.7 million hectares of 8.5 million hectares of economically irrigated land in Turkey have been opened to irrigation. Of this amount, 4.41 million hectares have a modern irrigation network built by State Hydraulic Works. The more the technology advances and new scientific discoveries are applied to agricultural practices, the more the efficiency of the production increases. For example, one of the most important factors for productivity increase is irrigation of agricultural land. One third of agricultural land is irrigated in Turkey. When the rest of the agricultural land reaches irrigation, this will make a significant contribution for self-sufficiency in many other products.

The Ministry of Agriculture and Forestry (MOAF) carries out important projects in implementing the technologies and decision support systems, technological agricultural applications, agricultural information systems, registration and database systems for Agriculture 4.0 both in its strategic plans and regulatory arrangements and in the fields of activity of the main service units.

Main applications regarding the digitalization and integration of technology in agriculture services by MOAF includes; the management of the village database with the Geographical Information System, digitization of agricultural parcels, monitoring and recording of agricultural production with satellite imaging; monitoring of air and satellite images with Integrated Administration and Control System (IACS) and Digitization of Land Parcel Identification System; creation of information systems such as Agricultural Information Systems and Agricultural System Integrated Management System, 52 Integrated Information Systems, agricultural observation stations, Agricultural Production and Registration System, Product Verification and Tracking System and National Agricultural Inventory Tracking System.

The total emission value calculated for the agriculture sector is 64.9 Mt CO₂ eq. for the year 2018 that is 15.2% of the total emission value including the LULUCF sector and 12.5% of all emissions excluding the LULUCF sector for the Republic of Turkey.

Total pesticide use decreased to 53,672 tonnes in 2020 with a percentage of 11 from 60,020 tonnes in 2018. The most commonly used pesticides are fungicides, herbicides and insecticides. Their values as tonnes are 20,600, 13,250 and 12,347 respectively. Turkey is ranked in a good place regarding agricultural pesticide use if compared with developed countries.

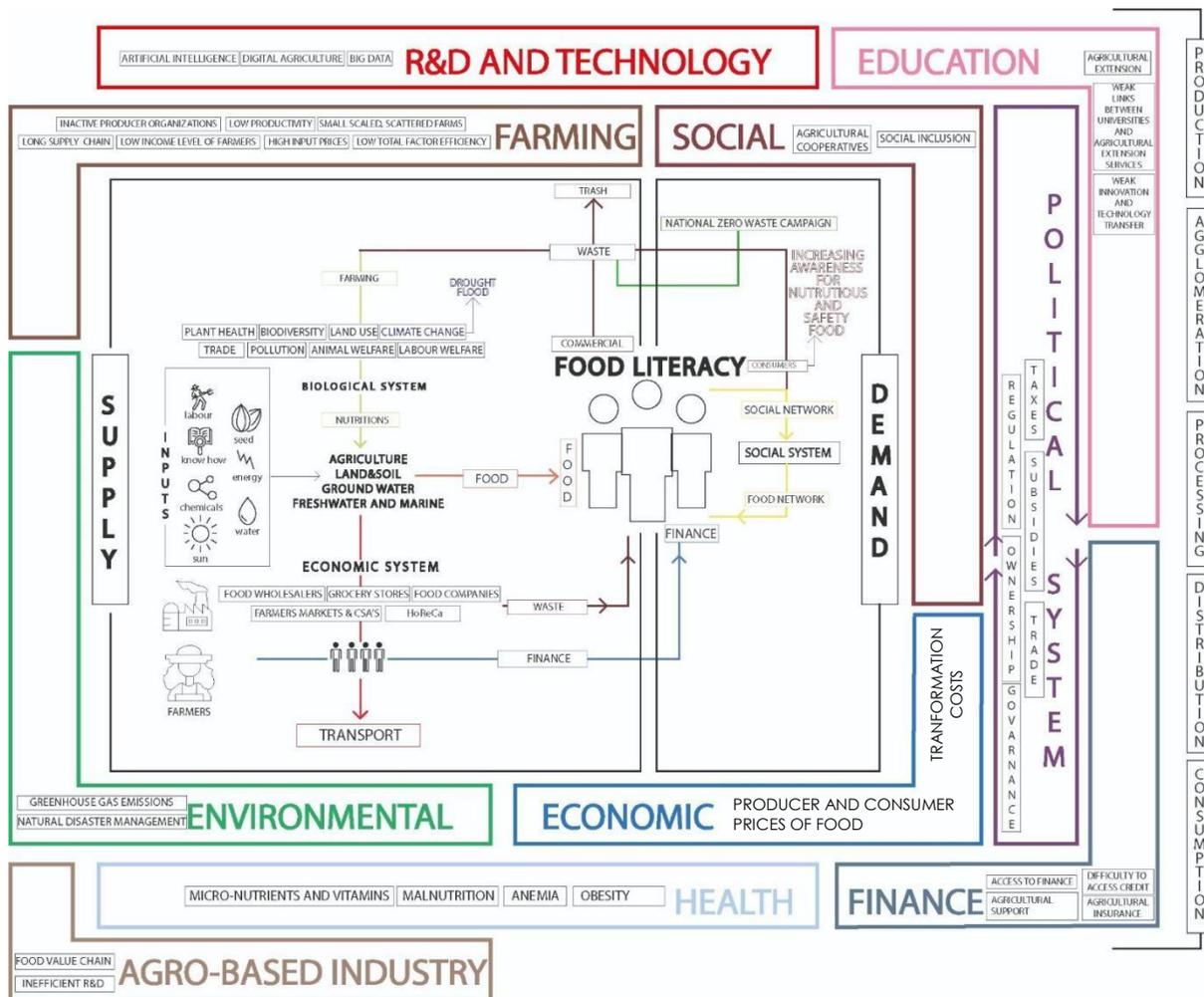


Figure 2. Food Systems in Turkey

Figure 2 shows the current food systems and challenges/main intervention areas for transforming food systems in Turkey. On the production side, the main problems for farmers are low productivity and marketing as well as the high prices of input such as fertilizers, oil and pesticides. The financial and digital liability are also too low. The food supply chain between producers and consumers is long and there are a few intermediaries regulating the market. Therefore, the small-scale farmers/family farmers need to sell their products much cheaper than the market prices since there are no perfect market conditions and well institutionalized agricultural cooperatives. The Ministry of Agriculture and Forestry mainly provides an extension service to farmers. But the universities need to be more engaged in the extension services. The technology or innovative techniques and know-how developed at the universities or research institutes need to be transferred to farmers directly. The curricula of agricultural education need to be revised according to the latest socio-economic changes in the agriculture sector and also be more integrated with industry in line with smart agriculture. For example, Turkey is one of the countries which is negatively affected by climate change. Drought is expected to be a serious risk in the next decade. The plant varieties resilient to drought need to be extended to all Turkey through extension experts. During the harvest of the products, there is a significant amount of harvest loss since there is insufficient equipment such as storage or warehouse and also lack of awareness. After the production, there are also some losses in the post-harvest process. Some of the products are lost during the transportation to

retailer, wholesaler or HoReCa because of the lack of equipment while some wastes in the consumption side.

The cooperation is not so common among smallholders in Turkey although some very good cooperative examples exist in the different regions. Cooperatives need to be encouraged and also technical and institutional capacity of existing cooperatives need to be improved. Cooperatives are particularly important for increasing income generation opportunities for women. Women cooperatives in rural areas can mobilize local product markets by producing healthy and local food and contribute directly to socio-economic wellbeing of rural families. Successful women-led cooperatives exist in Turkey and they need to be supported by customized policies while promoted as role models for other regions and disadvantaged women.

With respect to finance, the small holders have limited access to finance. MoAF supports small holders through Agricultural Credit Cooperatives, also State Bank gives credit with zero interest. However, farmers, mainly subsistence farmers are risk averse and they hesitate opening a business in both agriculture and non-agriculture sector. On the other hand, the R & D ability of the food companies is not too high in Turkey. So, traditional approaches and applications are still common in both managerial and technical sides.

Regarding the agri-environment concerns, awareness among small farmers for optimal use of pesticides and fertilizer is low. Excessive use of ground-water and over grazing is another problem in traditional farming practices.

With respect to technology, there is a growing number of start-ups that are interested in the agri-food sector. They develop technologies for the agriculture and food sector. This is a good opportunity for the Turkish agriculture sector. However, there is a lack of coordination among academia, public institutions, the private sector and other key actors. The cooperation and governance among these ones are quite important for building a dynamic agri-food sector and improvement of food systems in Turkey.

In respect to health, a rich diet is required for a healthy population. Some vulnerable groups in Turkey does not get the recommended daily intake of minerals and vitamins. The vitamins which are lower than recommended levels are Vitamin D, B1, B2 and B6. As for the minerals which are lower than recommended levels are iron, copper, calcium and zinc. Turkey's salt consumption is almost double of the recommended level. Obesity and low physical activity in individuals aged 15 and over are also high.

3. ACTION TRACKS

The UN Secretary-General will convene a Food Systems Summit on September 23, 2021 in New York so as to maximize the co-benefits of a food systems approach across the entire 2030 Agenda. The summit aims to provide a platform for ambitious new actions including innovative solutions on food systems from countries. The objectives of the Summit were as follow;

- to raise awareness of food systems' centrality to the entire sustainable development agenda, and the urgency of transforming food systems, particularly in the wake of a global pandemic;
- to Align stakeholders around a common understanding and narrative of a food system framework as a foundation for concerted actions, making food and food systems a more widespread issue for advocacy and put some concrete actions to achieve the 2030 Agenda;
- to recognize the need for inclusivity and innovation in food systems governance;
- Motivate and empower stakeholders who support food systems transformation through the development of improved tools, measurement, and analysis; and
- to catalyse, accelerate, and enlarge bold action for the transformation of food systems by all communities, including countries, cities, companies, civil society, citizens, and food producers.

In the framework of the Food Systems Summit, 5 main action tracks have been identified. The action tracks are not separate. Each action track could address some trade-offs with other tracks².

These action tracks are;

Action Track 1 : Ensure Access to Safe and Nutritious Food for All

Action Track 2 : Shift to Sustainable Consumption Pattern

Action Track 3 : Boost Nature Positive Production at sufficient scale

Action Track 4 : Advance Equitable Livelihoods

Action Track 5 : Build Resilience to Vulnerabilities, Shocks & Stresses

Among these actions, Turkey has made a significant contribution for the Action Track 2 and 5 at global level. However, a national dialog process was conducted for all five action tracks in Turkey. At the beginning, a sustainable food systems country report was prepared by the Ministry of Agriculture and Forestry in consultation with stakeholders from public, private, universities, NGOs and the disadvantaged groups, particularly women and youth.

The Republic of Turkey, with a participatory approach, contributes to the Summit dialogues at local, national and global scales, which are held to contribute to the achievement of the United Nations (UN) 2030 Agenda and Sustainable Development Goals.

Action Track 1- Ensuring Access to Safe and Nutritious Food for All

This action track refers to three main elements in the food system. These are the right to food, the rights to safe water and sanitation and the right to be free from discrimination (Hendriks,

² <https://www.un.org/en/food-systems-summit/action-tracks>

et. al., 2020). According to WHO (2020), 22 of percent of children under 5 years of age were stunted in 2019.

Diets high in fats, particularly meat and milk products, can be connected with high levels of income, whether at the national or the individual level (Drewnowski and Popkin, 1997). The more incomes grow, the more diets become more diverse and more people tend to consume red meat, milk, and fish as well as fruit and vegetables. In modern food systems, the abundance of food, especially ultra-processed food, is associated with increased risk of overweight, obesity and NCDs (HLPE, 2017).

Fluctuations in food prices, increasing population and demand for food, changing consumption habits, conflicts and economic fluctuations around the world, increases in agricultural input prices, climate change and its effects on agricultural production, limited natural resources, agricultural production and efficiency of natural resources affected by land degradation, water scarcity, rapid urbanization and abandonment of rural areas, the necessity of improving logistics infrastructure, and the recent effects of COVID-19 on food supply affect agricultural production and food security on a national and global scale. In this direction, food systems should be addressed in a sustainable way with a holistic and coordinated approach in order to solve today's problems and achieve the UN 2030 Agenda for Sustainable Development Goals. Sustainable food systems could serve as a useful tool to ensure food security and nutrition for all while securing the economic, social and environmental well-being of future generations.

It is very important that especially vulnerable groups have access to nutritious-balanced food. Many studies investigating the relationship between nutrition and health have revealed that the risk of some chronic diseases increases as a result of inadequate and unbalanced nutrition. The main health problems related to malnutrition detected in studies conducted in Turkey are protein-energy malnutrition in children, anemia, rachitism, weakness and obesity seen in school-age children and youth, iodine deficiency diseases.

According to the first survey made with 6 food firms, ensuring better food security and food safety and raising awareness of the community on healthy and balanced diet are considered as priority areas under Action Track One. The respondents suggest that access to safety and healthy food need to be improved and the current regulations that do not meet food safety criteria should be strengthened. Shortening the agricultural supply chain and reducing the number of middlemen in access to food play an essential role as an action. Dissemination of sustainable agriculture principles via agricultural extension services, making necessary arrangements on contractual farming in order to establish/strengthen cooperation mechanisms within the food system could be given as urgent actions received as feedback from private food companies.

With respect to the second survey received by 258 respondents, 28.08 % of the problems refers to Action Track 1. Two main intervention areas come to the front. These are sustainable food security and better public health and food safety. The measures under food security considered under this intervention area are ensuring food security and access to safe, healthy and nutritious food, healthy, balanced and adequate nutrition and waste management, disposal and reuse and recycling related to nutrition and nutritional ingredients. The other measure under this action track is public health and food safety. The measures are production of safe, healthy and nutritious food, inspections and controls, ensuring public health and food safety problems.

In the national dialogue workshop on sustainable food systems, a short online survey regarding the gathering participant thoughts on urgency of action tracks among other subjects (importance of cross-cutting areas among action tracks and most affected groups from climate change) was implemented. In this survey Action Track 1 is determined as the most urgent subject by national workshop participants with 42 % of the participants' votes.

Under Action Track 1, participants identified *lack of education for conscious nutrition, low efficiency and effectiveness of production process and products, lack of awareness of the consumer for conscious and therefore healthy food consumption, inadequacy of some nutrients and obesity problem and controlling food prices and losses* as the most problematic areas. Some of the prominent action suggestions regarding those problems include; disseminating urban farming, raising awareness about correct labelling and food literacy, supporting the use of technology in increasing food fortification studies for vitamin D and iron deficiency, researching regional nutrient deficiencies, raising awareness in food preparation and consumption and preventing losses and increasing lifelong education opportunities in the society.

Action Track 2 - Shift to Healthy and Sustainable Consumption Patterns

Food systems with socio-economic changes shift rapidly. The awareness of consumers about healthy food and sustainable agriculture as well as the environment grows. This action will help to catalyse a change in consumer behaviour and will encourage sustainably produced products by aiming to shorten food supply chains by taking into account the most disadvantaged groups. As underlined by (Herrero et al., 2021) that Action Track 2 recognizes that current food usage patterns lead to a great amount of food loss and food waste and unnecessary consumption of diets including high energy in both developing and developed countries. Therefore, this track will help to protect the natural resources and people, particularly the most vulnerable.

Afshin et.al. (2019) showed that the global average intake of red meat and sugar-sweetened beverages exceeds the recommended limits suggested by experts. The high level of consumption of red meat comes from Latin America where the livestock sector has an advantage and also in high-income North America. Red meat consumption is a very fragile issue for both developed and developing countries when considering the required protein source that needs to be taken by people. Particularly, ultra-processed meat is preferred by poor people living in suburban areas of developed countries. So, both developed and developing countries are negatively affected by the changing consumption patterns.

According to the 2020 data of the Ministry of Agriculture and Forestry, the number of farmers engaged in organic plant production is 52,590; organic plant production area is 382,665 ha and organic plant production amount is 1,631,943 tonnes. In this context, since 2005, the number of farmers and production have increased approximately 3 times and the production area has increased 4 times.

OECD/FAO, 2021a shows that average beef and veal meat consumption in Turkey in 2020 is 9.6 kgs. The consumption levels for the same periods in Argentina and the United States are 36.9 kgs and 26.2 kgs as shown in OECD (2021a), respectively. Regarding poultry meat, average consumption in Turkey is 19.2 kgs per capita in 2020, the average consumption of

poultry meat per capita for the same year in Israel, Malaysia and USA are 68.7, 53.1, 50.9, respectively (OECD, 2021a). The average consumption of sheep meat per capita in Turkey for 2020 is 4.2 kgs. With reference to wheat production, wheat production per hectare in 2019 was 2.5 tonnes, the average wheat production for New Zealand and the United Kingdom in the same year was 8.8 tonnes and 8.2 tonnes respectively (OECD, 2021b).

OECD (2019) points out that daily average fruit consumption among adults over 15-year-old was 57.1 %. Australia and Spain ranked highest with percentages of 94.8 % and 84 % while the consumption of fruit in Turkey, which is 51.6 %, is lower than average 57.1 %. Daily vegetable consumption among adults in Turkey was 60.9 % in 2017, which is higher than 59.6% that is the average daily consumption of OECD in 2017.

Fish and fish products including protein and rich omega-3 fatty acids are suggested as an alternative diet when considered low levels of consumption of fish and fish products. Turkey has a big potential for blue food. OECD/FAO (2019) shows that food consumption in fish and seafood was 5.0 kgs in 2016 in Turkey. The consumption percentages for Norway and Japan in the same year were 54.5 kgs and 47.9 kgs, respectively.

In respect to consumption of honey (daily grams per capita), Turkey ranks seven with 3.3 grams while central African republics ranks the first with 9,62 grams according to FAO statistics³.

Turkey has brought the agenda of food security, food loss and waste (FLW) issues for the last decade. In Turkey, the public sector, especially MOAF currently plays a pioneering role in reducing, preventing and managing FLW at the national and international level, even though some private companies, Civil Society Organizations undertake an active role in reducing food loss and waste including food banking activities at the local and regional level in Turkey. In this context, 'Technical Platform on the Measurement and Reduction of Food Loss and Waste', as a concrete output of Turkey's G20 Presidency, was established in the FAO Headquarters by FAO and IFPRI in 2015 with great efforts of the Ministry of Agriculture and Forestry. Furthermore, the Republic of Turkey launched the Campaign for preventing Bread Waste at the national level in order to raise awareness on prevention of bread waste and prevent bread waste at the consumption stage as well as promoting healthy bread consumption in 2013. Thanks to the Campaign conducted by Turkish Grain Board of the Ministry of Agriculture and Forestry, 384 million loaves of bread were saved in 2013, corresponded to the total amount of TRY 2,5 billion in 2014, the UN FAO considered the Campaign for Preventing Bread Waste as the most comprehensive practice carried out through a public institution and declared it as an example of good practice around the world for reducing food loss and waste. As to food banking, the Sub Commission of Investigation Researching and Dissemination of Food Banking Practice established within the Petition Commission of the Grand National Assembly of the Republic of Turkey prepared and published a report on this issue and identified some duties and brilliant recommendations for the relevant public bodies in 2018. However, the first and most comprehensive initiative which covers all sectors and all food products and also handles food banking practices for reducing food loss and waste by the Republic of Turkey is the Save Your Food Campaign made Guinness Record as the most promised campaign to reduce food loss and food waste in the field of environmental sustainability. Also, dissemination of food banking, encouraging commercial enterprises in order to bring technological solution for

³ [ca4657en.pdf \(fao.org\)](#)

surplus food, establishment of new business areas for the logistics of waste by stimulating companies do not dispose their waste with tax deductions. In May 2020, Turkey launched the Save Your Food Campaign in cooperation with FAO. The aims of the campaign are:

- to combat against food losses and waste both at national and international level,
- to raise public awareness on food losses and waste,
- to create a role model by extending good practices on food losses and waste implemented in the world, in Turkey and also other countries and
- to support the national Zero Waste Project.

To this end, the Ministry and FAO have organized a series of events with the involvement and assistance of relevant stakeholders to contribute to the planning and implementation of activities to be realized within the scope of the campaign. Turkey, in cooperation with all countries and relevant stakeholders, aims to intensify efforts at regional, national and international levels, to reduce and prevent food loss and waste. Within the campaign, 'Turkey's National Strategy Plan on Prevention, Reduction and Monitoring of Food Loss and Waste and Its Action Plan' was prepared by FAO (2020). The most important objective of the National Strategy Plan is to ensure that action is taken to prevent food loss and waste through the adoption of concrete solutions drawing on the advice of concerned stakeholders and local perspectives. The following points are summarized in the National Strategy Plan and Action Plan;

- raising awareness of the causes of food loss and waste; promoting solutions and trainings on prevention and reduction to all actors of the food supply chain including households; measuring, monitoring and evaluating food loss and waste; building capacity among different actors in the food chain to prevent, reduce and manage food loss and waste; changing consumer behaviour; increasing efficiency along the entire food supply chain to avoid discarding safe and nutritious products.

Online survey 1 showed that food loss and waste come front under Action Track 2. The main problems addressed by respondents are food waste and unstable food prices. Some concrete actions such as raising awareness on food loss and waste and reducing household waste are defined in the survey.

In regard to survey 2, 17.69 % of respondents indicated Action Track 2 as priority areas. The most important intervention area was considered as “Encouraging Transition to Sustainable Consumption and Prevention of Food Loss and Waste”. Food loss and food waste are the measures considered by respondents. “Preventing product loss by applying cold chain practices along food supply chains, reducing food waste in food services such as restaurants and at retail level by improving inventory management and tracking systems and reducing food waste at household level by improving food literacy for all age groups” are among concrete action suggestions by survey respondents under those measures.

In regard to the national dialogue workshop, 21% of national workshop participants think that Action Track 2 is the most urgent area for Turkey's food system. Emphasized problematic areas under the action track are; lack of awareness on safe and nutritious food, incompatibility between producers and consumers in the value chain, inadequate tracking systems for food

safety and information pollution regarding the area. Participants of the Action Track 2 discussion session in the national workshop suggested actions such as; *preventing information pollution on healthy and nutritious food, raising consumer awareness, developing food labelling practices, monitoring greenhouse gas emissions and water footprints in products, increasing biodiversity, introducing deterrent and incentive systems for the public to prevent waste, recycling food wastes to be used as pet feeds or in pharmacology, refining organic production, adopting “produce locally and consume locally” approach, bringing excess food suitable for human consumption to those in need with food banking applications* for transformation of national food system.

Action Track 3- Boost Nature Positive Production

Nature-positive food systems are defined by (Hodson et.al., 2021) as a regenerative, non-depleting and non-destructive use of natural resources. This action focuses primarily on food production systems for protecting natural systems and protected areas from new conversions for food production, managing food production systems in a sustainable way and restoring and rehabilitating degraded systems for sustainable food production and ecosystems (Hodson et.al., 2021). In this action track, consumer demands for sustainable food systems are quite important. It is considered that nature positive production, good agricultural practices or organic agriculture could have yield reductions, labour demand, more transaction costs and political incoherence. Agricultural information systems play an essential role to implement agricultural practices in a sustainable way. So, the agricultural extension services, universities and research institutions as well as technology producing companies can work under the same target. Green technologies also bring some outstanding solutions under this action track. With the help of technology, the small farmers can connect with each other and the other actors regarding technical knowledge on farming practices.

In recent years, rapid urbanization and industrial pressure triggered by migration from rural to urban areas, excessive use of natural resources due to rapid population growth and expansion of agricultural areas and tourism activities, global warming and many factors cause climate change problems. Furthermore, emissions in industrial areas cause air pollution and various environmental problems. Climate change problems are closely related to the scarcity of water resources and efficient use of water drought problems. Water use in irrigation reaches 74 % in Turkey. Agricultural production and natural resources due to climate change are affected negatively in terms of reduction of production amount, yield and quality of agricultural production, reduction of fishery products, decrease in biodiversity, erosion and land and ecosystems degradation.

Conducting research and modelling studies on the short, medium- and long-term effects of climate change on food supply, on the basis of the factors that trigger climate change and establishing a drought and flood information system together with an inventory system of land and soil systems assessed as significant preparation steps to transform into a nature-positive production approach.

Regarding online survey 1, climate change, principles of sustainable agriculture, scarcity and efficient use of water resources and sustainability and optimum productivity in food production

are indicated as main intervention areas under this action track. The problems presented by survey respondents are lack of environmentally friendly food production, inefficient use of water resources and high-water consumption, lack of systems that are resistant to climate change, increasing carbon emissions due to inefficiencies of energy resources use. Solution suggestions addressed by respondents regarding those problems are; increasing the joint working platforms for the private sector, unions, cooperatives, and state agencies, expanding the scope of legal regulations, sustainable agriculture and reduction of global greenhouse emissions, access to safe water, increasing use and dissemination of techniques and technologies that use natural resources efficiently, increasing the potential of obtaining biogas and energy from organic wastes, particularly from animal production wastes, as cost-effective and technology efficient, encouraging the reduction of carbon footprint along the value chain and controlling water consumption in agricultural production and increasing production efficiency.

With respect to online survey 2, 35.3 % of the respondents showed Action Track 3 as a priority area for Turkey. Under this track, better protection and sustainable use of the environment and natural resources is considered the most important intervention area. Climate change, scarcity and efficient use of water resources and sustainable use of natural resources are the measures considered under this track.

In regard to the national workshop, Action Track 3 is seen as the second urgent action track by the participants of the national workshop with 24% rate. The issues that are mostly discussed under the Action Track 3 area were; increasing amounts of food loss and waste, mainly due to lack of digitalization and use of smart agriculture techniques across the agri-food value chain, inefficient use of natural resources and lack of efficient land and production planning. Participants of the AT3 discussion session gave some significant feedback regarding the actions to be implemented for boosting nature positive production. *Dissemination of geographic information systems and smart agriculture practices, supporting farmers for digital transformation and use of smart agriculture techniques, enacting the Water Law and increasing water efficiency with the use of technology, disseminating climate-friendly agricultural practices, protecting local diversity and genetic resources, efficient use of natural resources and updating curriculums for adapting sustainable food systems in higher education* are among those solutions suggested by the participants.

Action Track 4- Advance Equitable Livelihoods

This action points out inequalities related to women, children, minority, youth and seasonal workers in agriculture, migrant and indigenous peoples. Distribution of natural resources in a more equal way by taking into account the vulnerable groups is important. The more people from low income groups or socially excluded groups have opportunities, the more the food systems work perfectly. Food prices stability will help the vulnerable groups that are negatively affected by high prices. Transforming from production pattern to consumption one brings some problems with it. Neufeld, et al. (2021) highlighted that there is a growing gap between the locality of food production and food consumption. The processes of the food chain need to be changed with the population dynamics in urban areas. Urban and rural people, particularly

vulnerable groups should access sufficient and nutritious food and also they need to be protected against pandemic conditions such as COVID-19. Migration from rural areas to urban areas is also a risk for sustainable agricultural production by causing socio-economic problems.

Increasing decent work opportunities and diversification of job opportunities, increasing livelihoods in rural areas taking into consideration disadvantaged groups have a big importance for sustainable production. Also the right to labour force participation and employment are integral parts of women's human rights. In this respect, gaining economic independence is a factor that positively affects women's health and social status. However, working life also has the potential to cause negative consequences for women's health when necessary precautions are not taken and the necessary conditions are not met in relation to the sector, workplace and working conditions. Informal employment of women, especially in agriculture and home-based –domestic- works, leads to exclusion of women from the protective mechanisms of social security systems.

So current food systems need to be transformed and be made more sustainable.

Social assistance system in Turkey includes gender sensitive policies. The system takes positive discrimination of women and girls into consideration in implementing of many social assistance schemes.

The structural change trends in the agricultural sector and the phenomenon of migration from rural to urban areas negatively transformed the labour market status of women who were previously working as unpaid family workers in the agricultural sector and made them unemployed or work in low-paid jobs without social security. Disproportionate burden on women in terms of the responsibilities at home, lacking the qualifications required by the labour market and the artificial obstacles such as discrimination can be counted as the main reasons behind this transformation.

Many studies have been carried out in cooperation with public institutions, private sector, NGOs and other related parties in order to enable women to fully participate in working life and to improve their positions in the labour market. There are also active labour market policies and vocational training programmes implemented in collaboration with ILO and other international organizations. The very first “Action Plan on Women’s Employment (2016-2018)” which was prepared as an outcome of “Empowerment Project of Women for Decent Work in Turkey” is one of the most significant examples of such efforts to improve the labour market conditions of women in Turkey as a joint effort of the Labour and Social Security and ILO.

Within the framework of the Action Plan, projects aimed at vocational training and employment of women have been supported. In this context, disadvantaged women groups such as women working informally in agriculture and home-based-domestic works, disabled women, divorced and widowed women have specially been targeted. Special courses, programmes, projects and protocols were implemented in order to maintain and encourage the employment of women and to improve their professional qualifications. In this context, 2.021 vocational training courses were organized and a total of 31.524 women attended those courses.

The Protocol on Cooperation for Empowering Women’s Cooperatives

A protocol was signed between the Ministry of Family and Social Services, Ministry of Trade and Ministry of Agriculture and Forestry on October 30, 2018. The goals of this protocol are as follows:

- to empower women's cooperatives,
- to ensure their sustainability,
- to improve their institutional capacity,
- to increase their visibility,
- to increase their number and
- to cooperate for the effective participation of women in economic and social life through these cooperatives.

Within the scope of this Protocol "Workshop on Empowering Women's Cooperatives" was organized on November 15, 2018 and together with all related parties, the current situation of women's cooperatives in Turkey, their problems and proposed solutions and the way forward were discussed. This workshop and its final report is still considered as an important progress and laid the ground for future studies on empowerment of women in the agriculture sector. Last but not least, this workshop underlined the importance and the effectiveness of a target-oriented common policy to provide formal employment for women through cooperatives, especially in rural areas.

"The Strategy Plan and Action Plan for Women's Empowerment (2018-2023)" prepared under the coordination of the General Directorate on the Status of Women of the Ministry of Family and Social Services, cover the efforts and projects of public institutions, local authorities, universities, NGOs, professional chambers, private sector and other related parties with the aim of empowering women in every aspects of social and economic life.

The current situation, main objectives, targets, strategies and activities related to five basic policy axes – education, health, economy, participation in decision making mechanisms and media – were addressed within this context.

In this respect, most significant strategies especially for the economic empowerment of women are;

- re-evaluating the legislation on labour market and realizing the necessary improvements for effective implementation within the framework of the goal of empowering women (Strategy No:1),
- strengthening the economic position of women and developing economic and social policies to combat informality, particularly in unpaid family labour (Strategy No:3), and
- intensifying the efforts for supporting the participation of women that require special policies in economic life (Strategy No:6).

The above-mentioned strategies were planned to be implemented via; continuing and increasing the efforts to strengthen and increase the number of women's cooperatives, developing vocational and skill training programs for seasonal migrant female agricultural workers, and encouraging women entrepreneurship in agriculture-based business lines, especially by utilizing technological opportunities and developments.

Online survey 1 also points out problems and solutions regarding inequalities in rural livelihoods. Regarding the action track; encouragement of young people and women for agricultural production, dissemination trainings that allow the farmers to learn and apply more productive and new production techniques with cooperation between public and private sectors, supporting and raising awareness of all stakeholders, more associating national Farmer Registration System with contractual farming and transition to traceable system in agricultural production, increasing decent job opportunities and livelihoods, improvement of rural area infrastructure and facilities etc. are proposed as solution suggestions.

In case of online survey 2, action track 4 was prioritized by 15.77% of the respondents and the main intervention area in the track was specified as “more inclusive sustainable food systems and poverty alleviation”. Improvement of living conditions in the rural areas, development of a more inclusive approach for disadvantaged people (poor farmers, women, youth etc.) takes part in the agriculture and food sector and diversification of economic activities and increasing employment opportunities in rural areas are some of the main action suggestions from the respondents.

With regard to the national workshop, only 8% of the national workshop participants think that Action Track 4 is the most urgent area. Despite this low urgency rate, under the specific discussion session for the action track participants emphasized urgency and importance of the equitable livelihood requirements for disadvantaged groups like foreigners under the temporary protection. Other stressed subjects under Action Track 4 are determined as; lack of decent job opportunities for youth in rural areas, informal employment conditions for women and other agriculture workers, lack of professional knowledge in agricultural production and lack of access to finance for disadvantaged groups. Action suggestions of session 4 participants for mentioned problem areas are; *establishing a nutrition modality especially for women and children and foreigners under temporary protection status, providing practical vocational training in agricultural production to young people, women and disadvantaged groups under temporary protection status and improving their job opportunities, defining the rights of those working agriculture sector and increasing the rate of formal employment, increasing efficiency of production unions and cooperatives, dissemination of contract farming activities, supporting young farmers, increasing the access of disadvantaged groups to technology.*

Rural population which is a big part of the food system in Turkey is among the most disadvantaged groups that is affected by inequalities in the food system changes. Seasonal workers whose numbers exceed 1 million are also among the vulnerable groups. In order to strengthen the rural population, the National Rural Development Strategy (2021-2023) was prepared by MOAF (2021a). The plan has 5 strategic objectives that reinforce the national pathway for Action Track 4. These are;

- Strategic Objective 1: Improving the Rural Economy and Increasing Employment Opportunities
- Strategic Objective 2: Improving the Rural Environment and Ensuring the Sustainability of Natural Resources
- Strategic Objective 3: Development of Social and Physical Infrastructure of Rural Settlements

· Strategic Objective 4: Development of Human and Social Capital of Rural Society and Poverty Reduction

· Strategic Objective 5: Development of Institutional Capacity for Local and Rural Development

Upon derivations from national dialogue process outputs and national action plans, the national pathway includes some actions for structural changes to be expected for the food systems, more inclusive policies for agri-food sector workers and the right to access and use of relevant technology for equitable deployment.

Action Track 5- Building Resilience to Vulnerabilities, Shocks and Stresses

OECD (2020) defines resilience with three capacities; the ability to respond to and cope with an adverse event in the short-term, the ability to make cumulative changes to a system in response to current or expected future situations and the ability to create a fundamentally new system. The pandemic could reflect a good example for resilience. Due to COVID-19 pandemic, high food prices, loss of income can cause people with low incomes to access sufficient and healthy food. Palmer et al (2018) stated that there is an increasing disconnection between rural and urban areas. This has a negative impact on the resilience of small-scale farmers, urban farmers, processors, traders and the health of vulnerable groups. Improving city region food systems will help people, particularly vulnerable people to access affordable and nutritious food, access to farmer markets, local and regional hubs to be established will help to shorten the supply chain.

With respect to online survey 1, Social, Economic and Environmental Problems due to Rural Immigration to Cities Triggered by Climate Change and Measure against Food Crises Induced by Conflicts, Natural Disasters, Climate Change, Outbreaks and Pandemics were indicated as intervention areas by respondents. The problems addressed by respondents are fair access to food and social, economic and environmental problems resulting from rural immigration induced by climate change. As solutions to those problems, respondents suggested some actions such as; revising the sustainable agriculture principles legislation, supporting the economic development of farmers in sustainable agriculture areas with a view to reduce / prevent migration from rural to urban and increasing aids to alleviate the problem of hunger under the leadership of humanitarian organizations and the United Nations.

Regarding online survey 2, only 2.69 % of the respondents indicated Action Track 5 as a priority area. Increasing the resilience of sustainable food systems against food crises was defined as the main measure under the action track. Some solutions indicated by respondents are; taking a more active role in the relevant studies of the international organizations, establishment of global and national food systems, building up the capacity of national and global planning and stocking capacity, development of standards and strengthening cooperation between the countries, and improvement of state supported insurance systems.

With regard to the national dialogue workshop, Action Track 5 was assessed as the most urgent subject only for 5% of the national workshop participants. However, AT5 discussion session participants determined some urgent requirements and actions for increasing the resilience of

food systems against climate change and national disasters. Session participants suggested; disseminating programs to increase the resilience of small producers, supporting local food systems, increasing terracing and planting applications, increasing the use of organic input in production and using less chemicals, preparing emergency and long-term resilience management projections and plans, supporting actors in the agri-food value chain, supporting producer unions, developing agriculture extension services for producers, local food networks, supporting producer markets, effective implementation of circular economy as the urgent actions to be implemented by the relevant institutions.

Turkey has experienced forest-fires recently. So, this situation shows the importance of cooperation and governance not only between national key relevant actors, but also between international actors.

In the evaluation part of the national workshop discussions, all participants were asked to specify the disadvantaged group that they think affected the most from climate change. According to the results, agricultural enterprises with 37% are thought to be the most affected group against climate change. Small holders with 32% came second. The rank was followed by immigrants (11%), children and youth (11%), women (8%) and babies under 5 years old (3%). Action Track 5 discussion session participants also emphasized the importance of action to increase resilience of small agricultural enterprises and smallholders for a sustainable food system approach. Actions such as informing and educating farmers about shocks and raising awareness by organizing research and training programs on a local basis with public-university cooperation are suggested for these specific target groups.

4. URGENT CHALLENGES AND NEEDS FOR THE FOOD SYSTEM TRANSFORMATION

This section is given in three parts according to the triple challenge in making better policies for the food system indicated by OECD (2021d). The first part is to analyse food security and nutrition with essential statistics for all in Turkey. Providing livelihoods to farmers and others in the food chain and promote rural development comes in the second part and the last one is to ensure environmental sustainability -i.e. using natural resources sustainably (including protecting valuable ecosystems and biodiversity) and reducing greenhouse gas emissions, as well as meeting other societal expectations such as animal welfare.

On the other hand, in general, raising awareness on sustainable food systems is very important to get more valuable information and opinion from the stakeholders, due to the complexity of the sustainable food systems. Stakeholders who receive information on this issue should have at least basic information about what sustainable food system concept means and why there is a need for transforming and improving food systems and which benefits would be provided with transformation of food systems. Also, it would be beneficial to make stakeholder analysis and involve all relevant actors as a part of sustainable food systems in the dialogue process at different levels (informing, consulting, implementing etc.) to identify realistic problematic areas, most relevant solutions and implementable actions with the necessary ownership.

Reaching new innovative solutions to improve and transform sustainable food systems and synthesizing with current studies and efforts are another aspect that should be considered. Sustainable circular bio-economy strategy needs to be prepared immediately. Also financial burden on transforming food systems should be considered as a challenge.

4.1. Food Security and Nutrition

Food Security

Food security is defined by FAO (1996) as it exists “all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.”

The figure 3 shows that Turkey is a strong country regarding proportion of population under global poverty line, sufficiency of supply, micronutrient availability, market access and agricultural financial services, food safety, protein quality and food safety net programs.

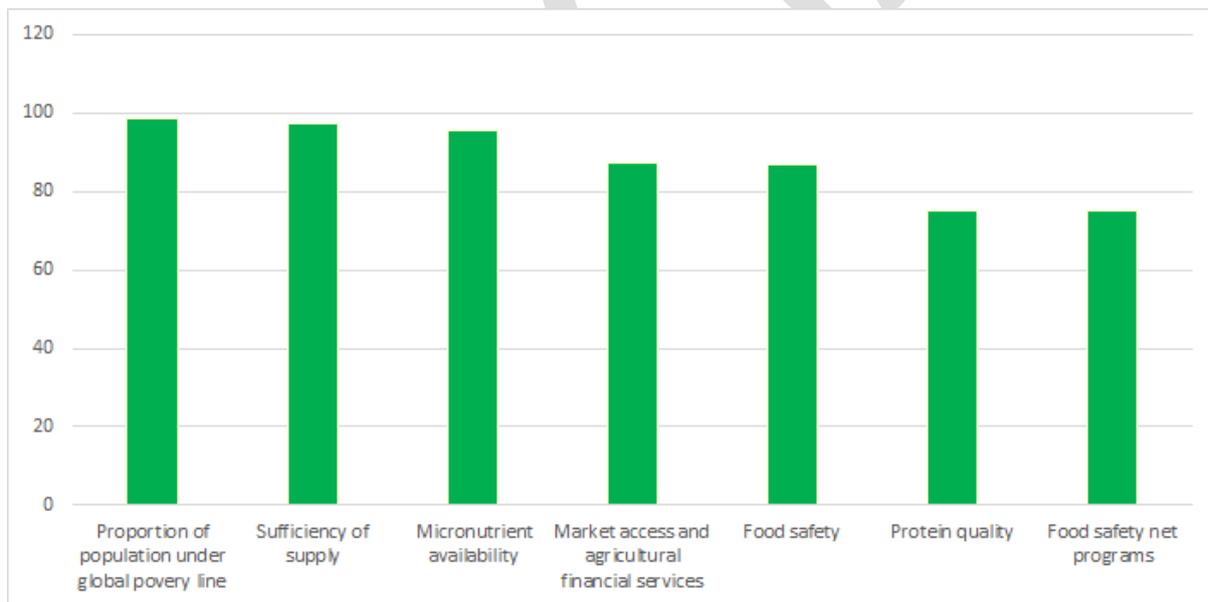


Figure 3. Food Security Index of Turkey*

*"Strengths" are defined as any indicator score above 75.0

Turkey’s population is 83,6 million. The population is projected to be reached 93,328,574 in 2030 and 104,749,423 in 2050 in Turkey according to TURKSTAT. Primary agriculture accounts for 6,7 % of GDP and employs 16 % of the workforce according to TURKSTAT. This clearly shows that agriculture plays a vital role in the economy of Turkey. The country is a net exporter of a significant number of agricultural products, which account for more than 10 % of total exports. The ratio of export and import values of agriculture, forestry and fishing is

around 60 % in 2020. The ratio of export to import values of manufacture of food products constantly increases in the last decade and it was over 200 % in 2020. Lastly, the ratio of export to import of beverages was over 50 % in 2020.

According to the Medium-Term Program (2021), added value in the agriculture sector increased by 8.7 percent in the first quarter of 2021. According to OECD statistical databases, the GDP of Turkey increased to USD 2,347 billion in Purchasing Power Parities (PPPs) in 2019 from USD 609 in 2000. According to the inflation data of February 2021 announced by TURKSTAT, the GDP per capita was USD 8.599, and this amount was approximately 1/3 of the agricultural population which was measured as 2.836 USD.

The agricultural area decreased to 37,802 thousand ha. in 2020 from 40,479 ha. in 2019. The share of Agriculture in GDP was 6.7 % in 2020 while it was 10.0 in 2000. Agriculture share in employment decreased to 16 % in 2020 from 36.0 %. Crop in total agricultural production decreased to 44 % in 2019 from 69 % in 2000. On the other hand, Livestock in total agricultural production increased to 56 % in 2019 from 31 % in 2000. Share of arable land decreased to 52 % in 2019 from 59 % in 2000.

According to FAO statistics, average protein supply in Turkey increased to 109.3 g/capita/day in the period of 2016-2018 from 103.7 g/capita/day in the period of 2000-2002. Average supply of protein of animal origin increased to 37.7 g/capita/day in 2016-2018 from 24.3 g/capita/day. The percentage of the population using at least basic drinking water services was 97% in 2020 and 99 % for the population using at least basic sanitation services. Per capita food supply variability was 32 in 2019. Regarding yield in cereals, 12.865.300 hectare was harvested and yielded 9.894 tonnes in 1961. The yield rose to 32,008 tonnes in 2019 from 10,746,739-hectare in 1961.

Regarding agricultural producers' status, there are 2,306,305 farmers according to the farmers registration system and 82,6 % of the Agricultural holdings are under 100 da. in Turkey. The number of agricultural holdings over 200 da. is only 6,4 % (MoAF, 2020). The figure 4 refers to the fact that more than 80 % of total farm incomes in Turkey are shared by farms which are larger than $\geq 5,000$. The smaller farmers cannot have a fair share and also the input prices are not affordable for them. This clearly shows that the livelihood is getting harder with the smaller size of farms in Turkey. According to MoAF (2020), the main challenges of small holders in Turkey are accessing finance, cooperation, risk averse, lack of leadership and difficulty to reach to market and the heavy procedures in grant programs. The small holders cannot save capital to create a viable business in both agriculture and non-agriculture sectors since they operate at low levels of resource efficiency and output.

Small holders, particularly fruit and vegetable producers, have difficulty to access the market since their products are perishable. So, cooperative marketing seems one of the most effective ways for those groups to handle marketing problems. The number of members of cooperatives is 3.5 million. Although there is a significant number of cooperative members in Turkey, institutional and technical capacity needs to be developed. Therefore, there are still some rooms to progress for cooperative members including subsistence farmers to acquire managerial skill for quick decision to buy or sell.

Farm output in perishable products such as vegetables and fish may be produced for consumption in an area fairly close to the farm. Cooperative marketing is one of the most effective ways for subsistence farmers to deal with marketing problems.

In addition, wholesale markets also offer an alternative marketing way for especially small-scale fruit and vegetable producers without adequate professional organization and storage and transportation facility. There are 176 wholesale markets in Turkey established by municipalities or private persons. However, it is needed that the infrastructure and capacity of these wholesale markets are developed so that they can fully perform their marketing functions.

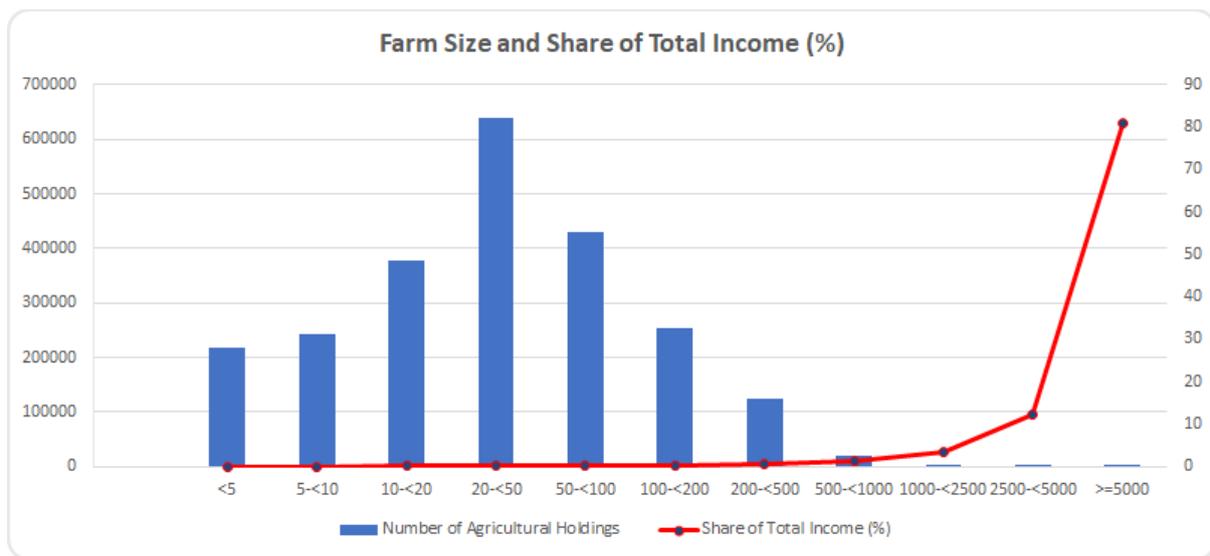


Figure 4. Farm Size and Share of Total Income in Turkey

Source: MoAF, 2020a

Agricultural input price index which is released by TURKSTAT (2021) is shown in figure 5. The biggest increase was in electricity while the lowest increase was in veterinary expenses. The increase rates of electricity and motor oil under energy are 187.5 and 150.8, respectively. Fertilisers and soil improvers increased by 121.6 %. Regarding goods and services contributing to agricultural investment, farm buildings (non-residential) increased by 184.8 % in the years of 2016-2021.

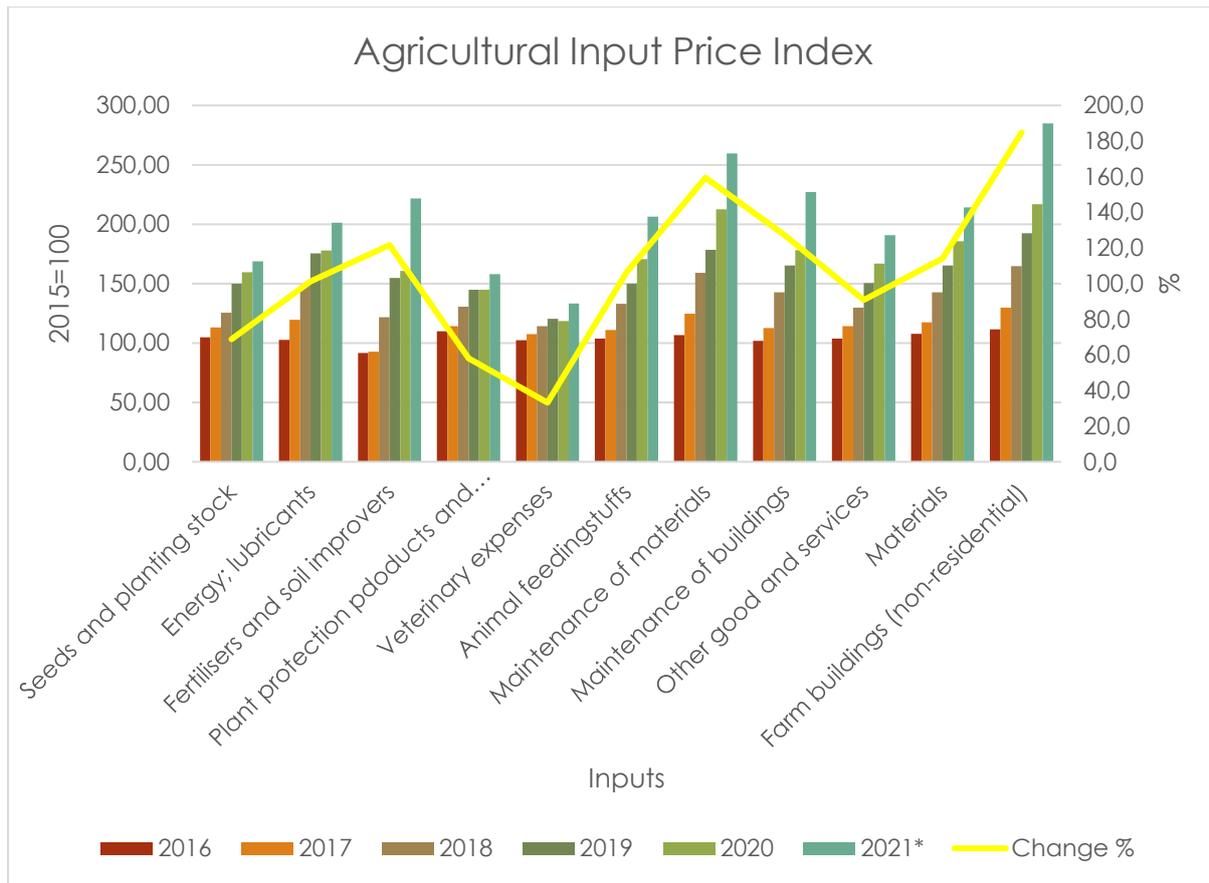


Figure 5. Agricultural Input Price Index

Source: TURKSTAT (2021)

According to the wheat projections made by OECD/FAO (2021), Turkey's wheat production is expected to increase to 23,409,000 tonnes by 2030. The growth rate of Turkey (1.40) in the years of 2021-2030 will be more than average of world wheat production (0.89) (Figure 5).

Regarding projected consumption figure 6 for wheat and food, by 2030 wheat consumption is expected to increase 25,405,000 tonnes from 23,006,000 in 2018-20 est. With respect to food kg/per capita will increase to 214,8 by 2030 with a percentage of 1.7 from 211,2 in 2018-20 est. Sugar consumption will increase to 15.6 kg per capita with a percentage of 0.14. Beef and veal consumption are projected to be increased to 36 kg per capita with a percentage of 56.5 % in the next decade while sheep meat will be stable regarding consumption level as indicated in figure 7. But considering the fact that current beef and veal meat consumption in Turkey is 23 kg per capita while the average beef and veal consumption in Argentina and the United States are 36 kgs and 26 kgs, respectively (OECD, 2021a). Therefore, red meat consumption needs to be increased at sufficient scale as indicated in the 11th National Development Plan.

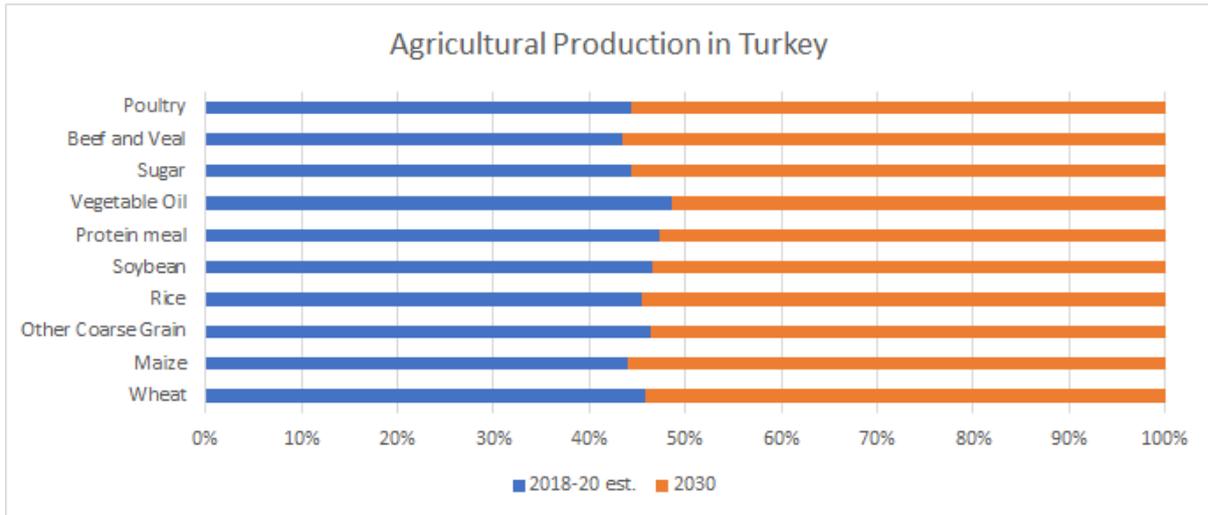


Figure 6. Agricultural Production and Projections for 2030

Source: OECD/FAO, 2021

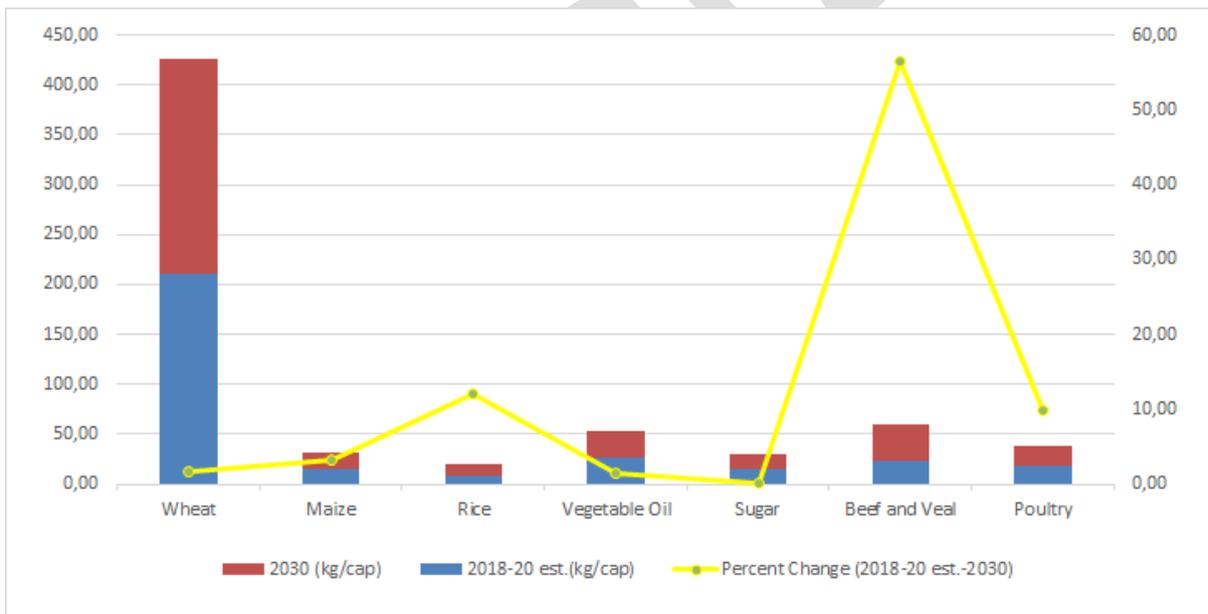


Figure 7. Consumption Projections in some Agricultural Products

Source: OECD/FAO, 2021

According to a survey made by the Ministry of Health (2019), the frequency of individuals who are worried that they will not be able to find enough food due to a lack of food is 23.4%, the frequency of those indicating that they cannot consume healthy and nutritious food was found as 22.7 %. With respect to health, the prevalence of obesity in the adult population (18 years and older) was 32.1 % in 2016. This figure was 22.2 % in 2000.

The 11th development plan of Turkey puts some targets to be achieved by 2023, which are considered important for the Food Security and Nutrition challenge. Increasing production of red meat, oilseeds, land consolidation and increasing irrigated net agricultural area, pasture

reclamation and management area are some of the targets to be achieved in the plan. In terms of the meat sector, there is a production expansion for red meat and poultry meat in Turkey (Strategy and Budget, 2019).

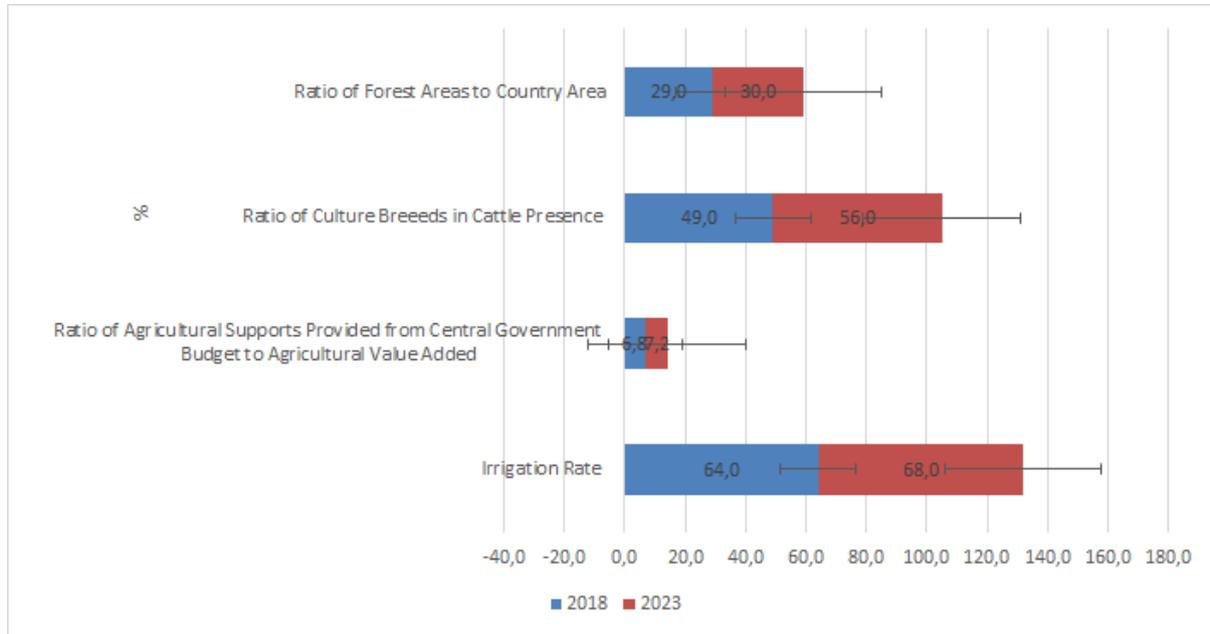


Figure 8. Targets (%) in Agriculture Sector, 11th Development Plan

Source: Strategy and Budget Department of Presidency, 2019

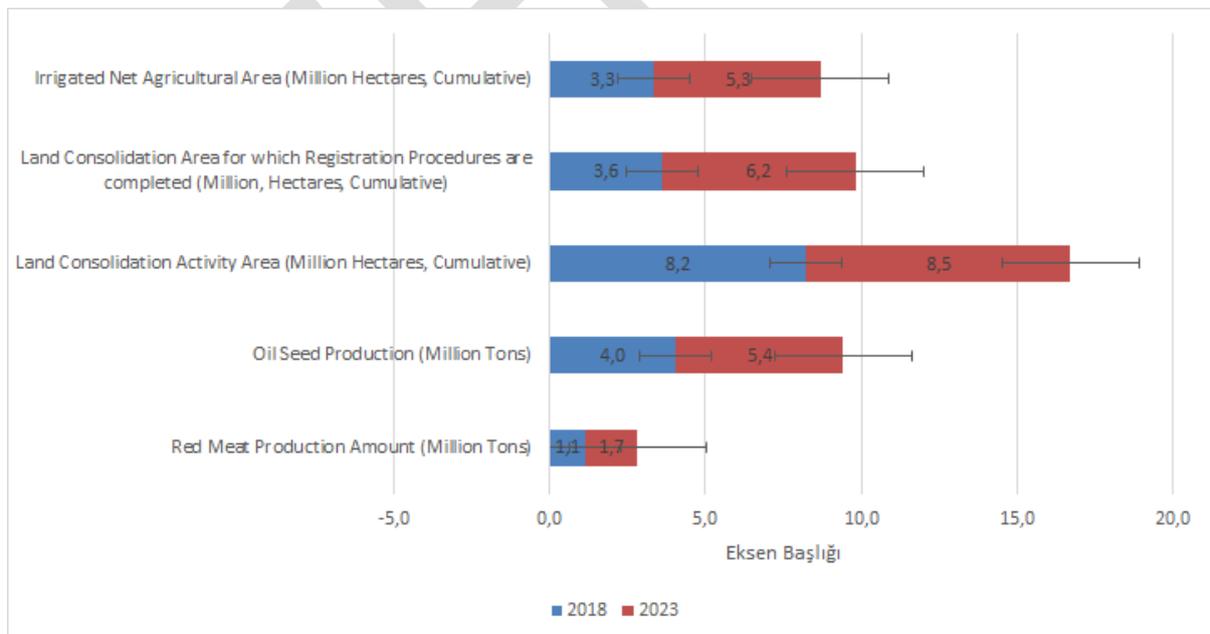


Figure 9. Targets (Million Ha. /tons) in Agriculture Sector, 11th. Development Plan

Source: Presidency of Strategy and Budget, 2019

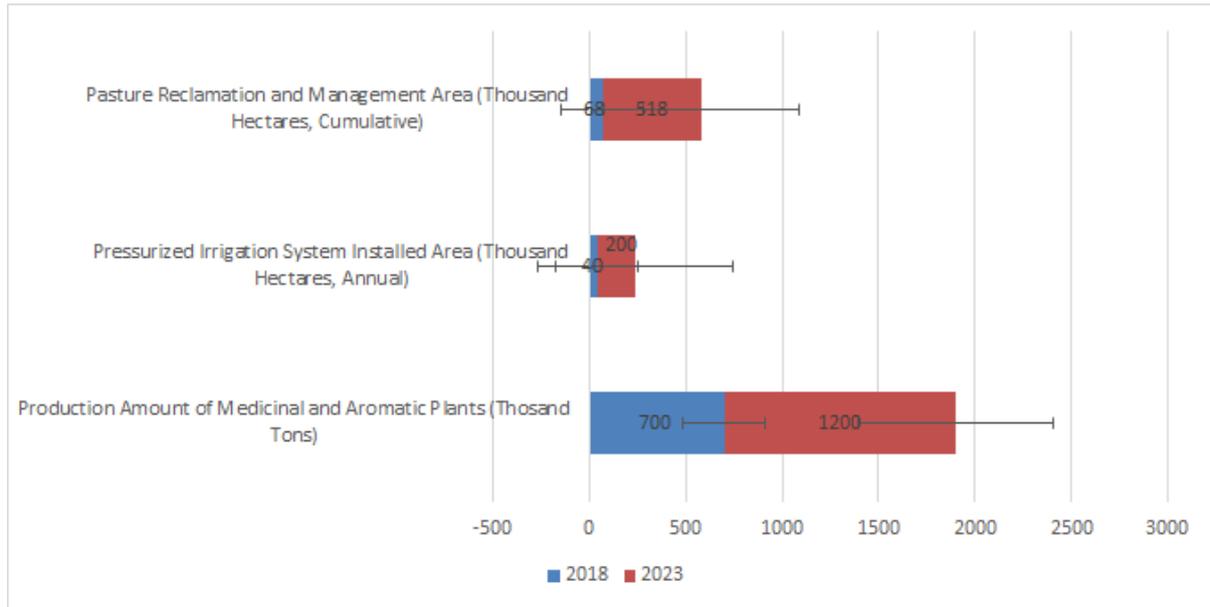


Figure 10. Targets (Thousand Ha.) in Agriculture Sector, 11th. Development Plan

Source: Presidency of Strategy and Budget, 2019

Nutrition

The basic food consumed in Turkey is bread and cereal products. Therefore, enrichment of wheat in terms of nutritional quality is of great importance. A research made in 2017 by MOH (2017) indicated that there are insufficient dietary intake of iron, Vitamin D and folic acid in Turkey. According to dietary reference intake values, the proportion of the population that is below the dietary intake in individuals aged 15 years and over was found to be 66.4% for iron, 96.0% for vitamin D, and 34.4% for folic acid. Turkey Nutrition and Health Research based on a survey made with over 24,000 people shows that men aged 15 and over consume 243.8% of the recommended daily intake of vitamin A, 149.1% of vitamin E intake, 139.4% of folate intake, and 128.2% of vitamin C intake. The intake of vitamin B6 in men for the same group is found as 91.6% and 23.7% for vitamin D. Women in the same age group consume 212.4% of daily recommended intake of vitamin A, 150% of vitamin E intake, 110.1% of folate intake, 135.0% of vitamin C intake, the intake of vitamin B6 is 83.2%, 87.7% for Vitamin B1, 82 % for the vitamin B2 and 16.9 % for vitamin D (The Ministry of Health, 2020).

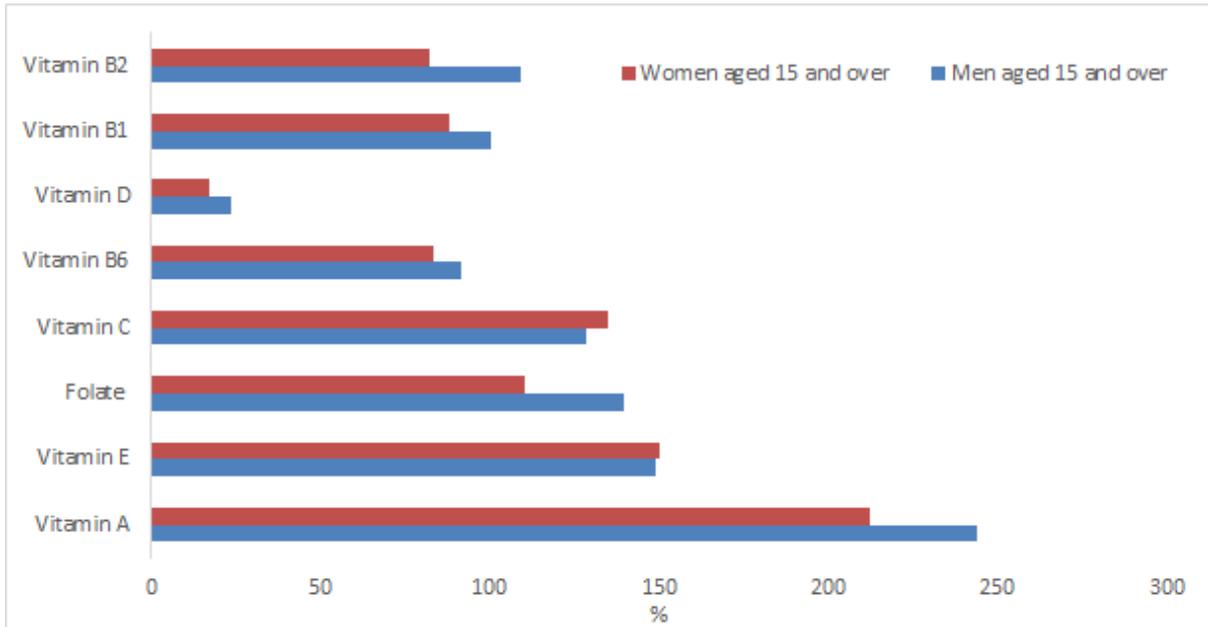


Figure 11. The Daily Recommended Intake of Vitamins (%)

Source: The Ministry of Health, 2020

Regarding minerals, men aged 15 and over participating in the study meet 93.1% of the recommended daily intake of magnesium, 89.1% of the zinc intake, and 76.4% of the potassium intake. The research points out that men aged 15 and over meet 113.52% of the daily recommended intake with calcium intakes, 107.5% in iron, 221.4% in phosphorus and 122.7% in copper intake. As for the daily intakes of women to meet the recommended amounts are found as 167.4% for phosphorus and 113.4% for copper, 92.8% for calcium, 87.7% for magnesium, 71.5% for iron, 78.0% for zinc, 62.5% for potassium. As clearly seen in the figures iron deficiency is an important problem among women in Turkey.

Regarding obesity in children, a survey made in 2016 shows that obesity rate was found to be 9.9% in primary school 2nd grade children.

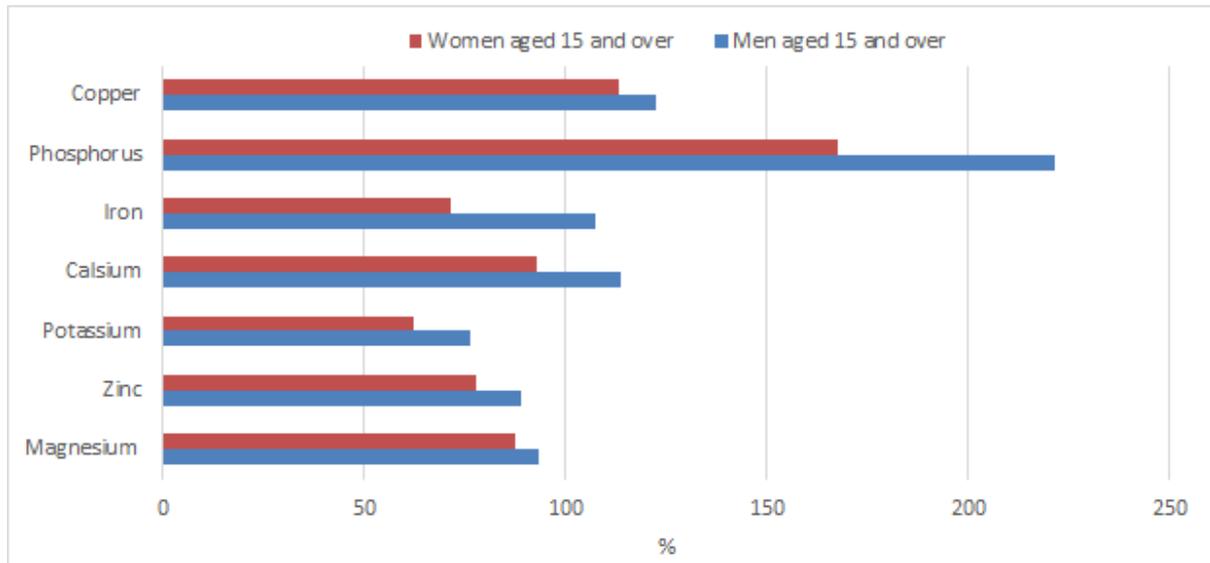


Figure 12. The Daily Recommended Intake of Minerals (%)

Source: The Ministry of Health, 2020

According to Turkey Nutrition and Health Research, obesity and low physical activity in individuals aged 15 and over were found as 31.5 % and 42.4%, respectively (The Ministry of Health, 2017). Increasing income level of population, rapid urbanization, changing diet are some of the factors of obesity. Percentage of child malnutrition increased to 1.7 % in 2018 from 1,1 % in 2014.

The prevalence of diabetes is increasing in Turkey. According to the International Diabetes Federation, Diabetes Atlas⁴ diabetes prevalence among the people ages 20 to 79 increased from 8 % in 2010 to % 11.1 in 2019. Afshin et al. (2019) stated that increased urbanisation and greater female participation in the workforce are two main factors behind the increased consumption of processed or ultra-processed food and higher amounts of sugar, salt and fats. Those tend to change their consumption pattern by eating outside the home. This poor nutrition could lead to poor health outcomes and contribute to type 2 diabetes. For the diabetes patients, patient education, medical nutrition therapy and exercise are recommended by the Ministry of Health (2014).

The National Household Health Survey conducted by the World Health Organization Country Office in Turkey in 2018 showed that salt consumption per capita in Turkey was found as 9.9 grams, which is higher than the recommended intake (5 grams) (World Health Organization, 2018). Turkey Nutrition and Health Research conducted by the Ministry of Health gives a profound information on nutrition and health and it is periodically updated.

⁴ <https://data.worldbank.org/indicator/SH.STA.DIAB.ZS?locations=OE>

4.2. Food Chain and Rural Development

Improving the efficiency of the food chain can help increase food supply by reducing harvest and post-harvest losses from primary production to retail stages. Losses mainly occur due to the inadequate infrastructure including water and electricity, poor transportation systems, and a lack of storage facilities. Setting up a digital infrastructure can help the whole food chain to be more effective.

Harvest losses and post-harvest losses are one of major elements of food systems. Therefore, reducing the losses in harvest and post-harvest by increasing the efficiency of the food chain is quite important in order to access fair food for all. Investment to be made for transportation systems and infrastructure or installing efficient monitoring systems with the help of artificial intelligence can help to reduce food insecurity.

As indicated in the figure 13, Turkey is self-sufficient in many crops and fruit and vegetables. However, the losses in harvest and post-harvest are so high. The most important harvest losses are seen in tea with 15% and wheat with 5.5%. Regarding post-harvest losses, the products which are to a certain extent subject to post harvest losses are total vegetable balance and citrus.

Food banks can offer a good alternative, as there is no mechanism for farmers to distribute products they cannot sell for free. The percentages of losses in fruit and vegetables are 12.1 and 7.4, respectively. Due to the self-sufficiency levels in Turkey, it can be said that a rich diet including red meat and fruit and vegetables need to be transferred to vulnerable groups, with low income groups, women, seasonal workers etc. FAO in collaboration with the Ministry of Agriculture and Forestry prepared a national strategy and action plan for reducing food loss and waste (MoAF/FAO, 2020).

According to the Turkey Waste Report prepared by the Ministry of Trade, it is stated that 5.4% of the consumers in Turkey throw away the leftover food and 23% of the purchased food is thrown away without being consumed (The Ministry of Trade, 2018).

In order to measure the effectiveness of the Save Your Food Campaign in cooperation with FAO, the Ministry of Agriculture and Forestry made a survey conducted independently on food loss and waste in Turkey. According to pre- and post-the survey results:

- The annual food wastage increased below inflation and a total savings of TRY 664 million emerged for Turkey
- Increasing consumer awareness both in the planning of food shopping and in the protection of food were ensured
- Awareness of Use by Date and Best Before Date concepts has increased by 20%, consumers have begun to be more careful,
- Loss of freshness and/or deterioration of products is justified as the main cause of food waste,
- Significant reduction (22% -> 13%) in food wastage due to over/wrong cooking was gained

- There is a significant increase in the reuse rate of wasted foods (45% -> 55%), the rate of those who make compost increased from 3% to 6%,
- The campaign achieved a higher awareness than expected with a awareness rate of 24% (1 out of every 4 people heard of the Campaign)
- It is seen that 93% of those who heard about the campaign found the campaign useful, and 84% started to be more careful about food waste after the campaign. However, there is a lot of study to overcome FLW.

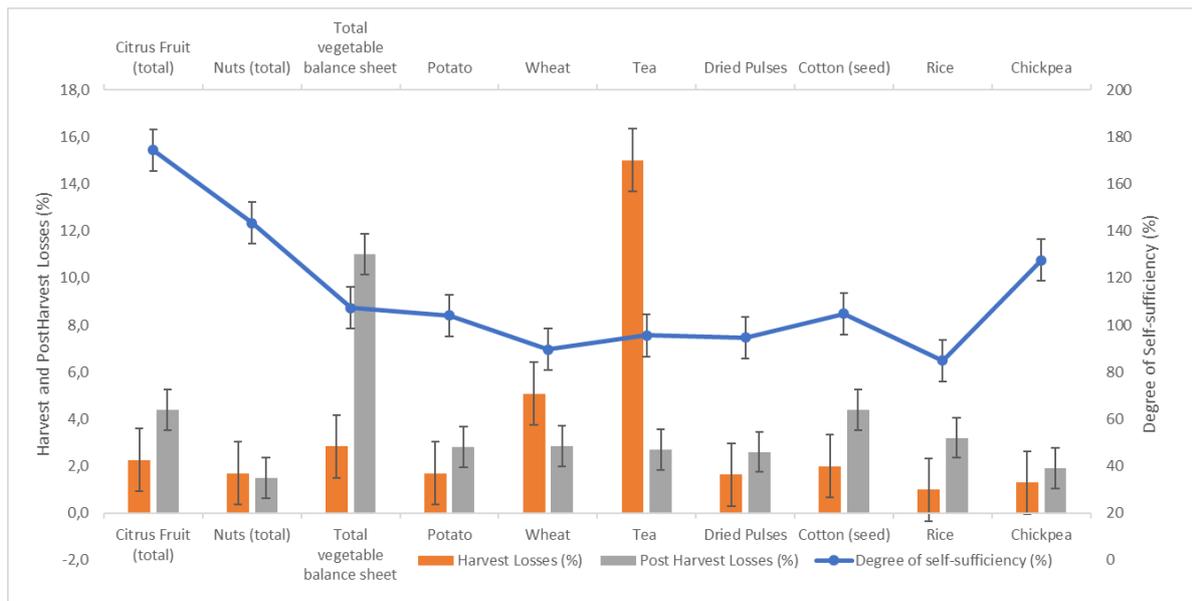


Figure 13. Crop Products Balance, 2019-20

Source: TURKSTAT, 2019

As to rural development, as indicated in the National Rural Development Strategy of Turkey covering 2021-23, small-sized enterprises will be developed, agricultural productivity will be increased, quality of life will be improved and human and social capital will be strengthened in rural areas. The level of integration of these regions with the national market and other areas will be raised and the quality of and the accessibility to education, health, communication and local government services will be improved. The rural workforce, especially women and young people, who have left their job in the agricultural sector but continue to reside in rural areas, will be directed to agricultural or non-agricultural production activities, by cooperating with other ministries, relevant institutions and organizations (The Ministry of Agriculture and Forestry, 2021).

Though Turkey, implements measures to combat COVID-19 and food safety and security problems aren't expected, agri-food sector has faced some challenges (such as production losses, lack of temporary labour, decreasing labour and farmer incomes and sales, fluctuating

produce prices, high consumer food prices, import/export restrictions, changes in tariffs, marketing channels, customer attitudes, imports of agricultural imports). Structure of small-sized, subsistence and semi-subsistence farms are one of the bottlenecks of the sector and these ones need to be more supported in food crises times. Temporary lockdowns also negatively affected smallholders having difficulty to access markets, whose incomes mostly depended on district bazaars. Agricultural employment is also vulnerable to shocks. Many traditional retailers in Turkey harmonize their systems to online delivery due to COVID - 19.

Rural poverty and lack of financial and social incentives continue to stand as one of the major reasons behind rural-urban migration causing also problems for urban development. Therefore, the generational renewal in rural areas and increase in agriculture-related employment are encouraged as the youth is crucial for the rural digitalization and promotion of innovation and R&D in the agricultural sector. Digitalization of agriculture, food supply and delivery channels can provide ways to modernise the agri-food system defined in the related WB report. Some digital technologies (IoT, AI, Blockchain, big data solutions etc.) started to be used. Nevertheless, digital transformation for food systems has some drawbacks such as low literacy, increasing digital divides, lack of investment, legislative problems with data security and protection. Adaptation of digital technologies requires a little bit of time. In a bid to promote the adoption and use of digital technologies (DTs) in rural communities, the rural development policies emphasized the need for empowering rural youth and increasing their quality of life. It is underlined that the crucial importance of the presence of young farmers in order to achieve the sustainable development goals set by the 2030 UN SDGs and EU Post-2022 CAP priorities.

4.3. Environmental Sustainability

In Turkey, the Agricultural Land Conservation Program for Environmental Purposes⁵ has been implemented since 2006. The number of provinces where Agricultural Land Conservation Program for Environmental Purposes reached 58 provinces in 2019. The implementation area covered a total of 721,443 ha. 188,661 farmers have benefited from the program so far.

The figure 14 shows that the share of water abstraction in the agriculture sector is too high. Considering the irrigation infrastructure in agriculture in Turkey; 13% sprinkler, 7% drip irrigation method, 80% surface irrigation method is used. Irrigated land still needs to be improved. The use of ground-water in the agriculture sector is also high. The National Water Plan emphasized the protection of quality and quantity of groundwater. In the last decade a significant part of land has been open for irrigation. 11th. The National Development plan also targets to increase the irrigated land until 2023 with an increase of 2 million hectares in the years between 2018-23. A proper balance of nitrogen and potassium is essential for converting energy into new plant material. The figures can be seen in the figure below.

⁵ [ÇATAK \(Çevre Amaçlı Tarım Arazilerini Koruma Programı\) \(tarimorman.gov.tr\)](http://tarimorman.gov.tr)

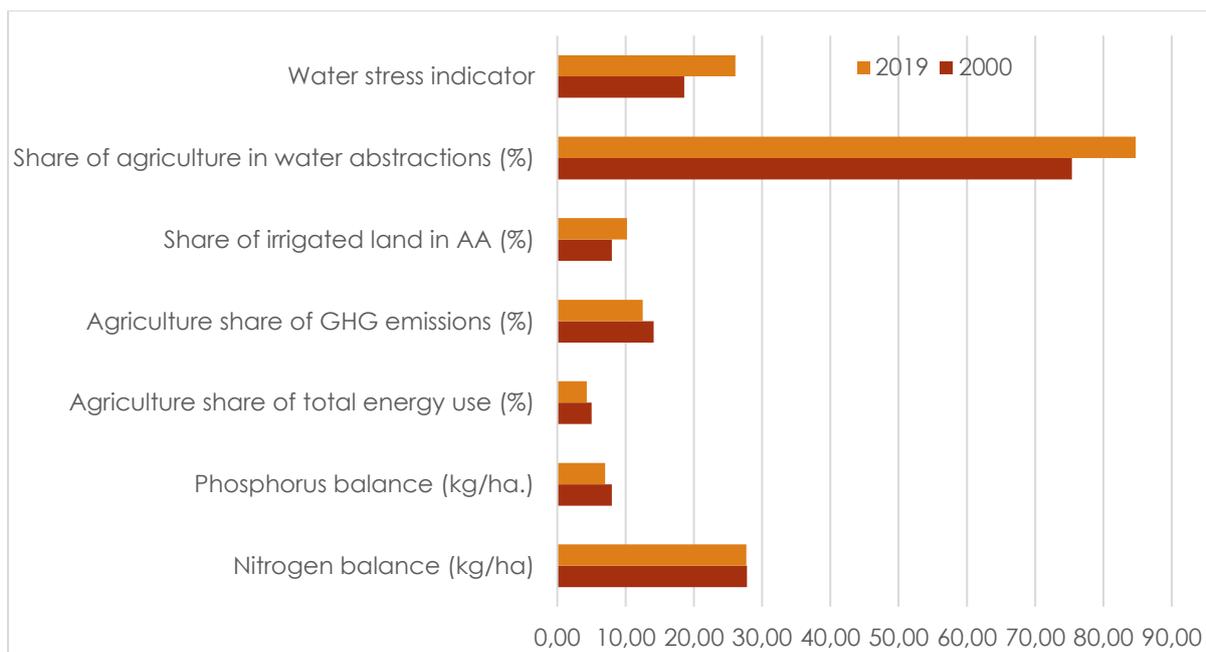


Figure 14. Environmental Indicators in Turkey

Source: OECD, 2021c

The total emission value calculated for the agriculture sector is 64.9 Mt CO₂ eq. for the year 2018 that is 15.2% of the total emission value including Land Use, Land Use Change and Forestry (LULUCF) sector and 12.5% of all emissions excluding the LULUCF sector for the Republic of Turkey (TURKSTAT, 2020).

Figure 15 points out that pesticide use reached peak in 2018 and after that there is relatively lower use of pesticides. Total pesticide uses in 2018 was 60,020 tonnes, and decreased to 53,672 tonnes in 2020 with a percentage of 11 %. The most commonly used pesticides are fungicides, herbicides and insecticides. Their values as tonnes are 20,600, 13,250 and 12,347, respectively. During the years of 2006-2020, the use of herbicides doubled. One of the aims of extending sustainable agricultural practices is to lessen excessive use of pesticides in agricultural production.

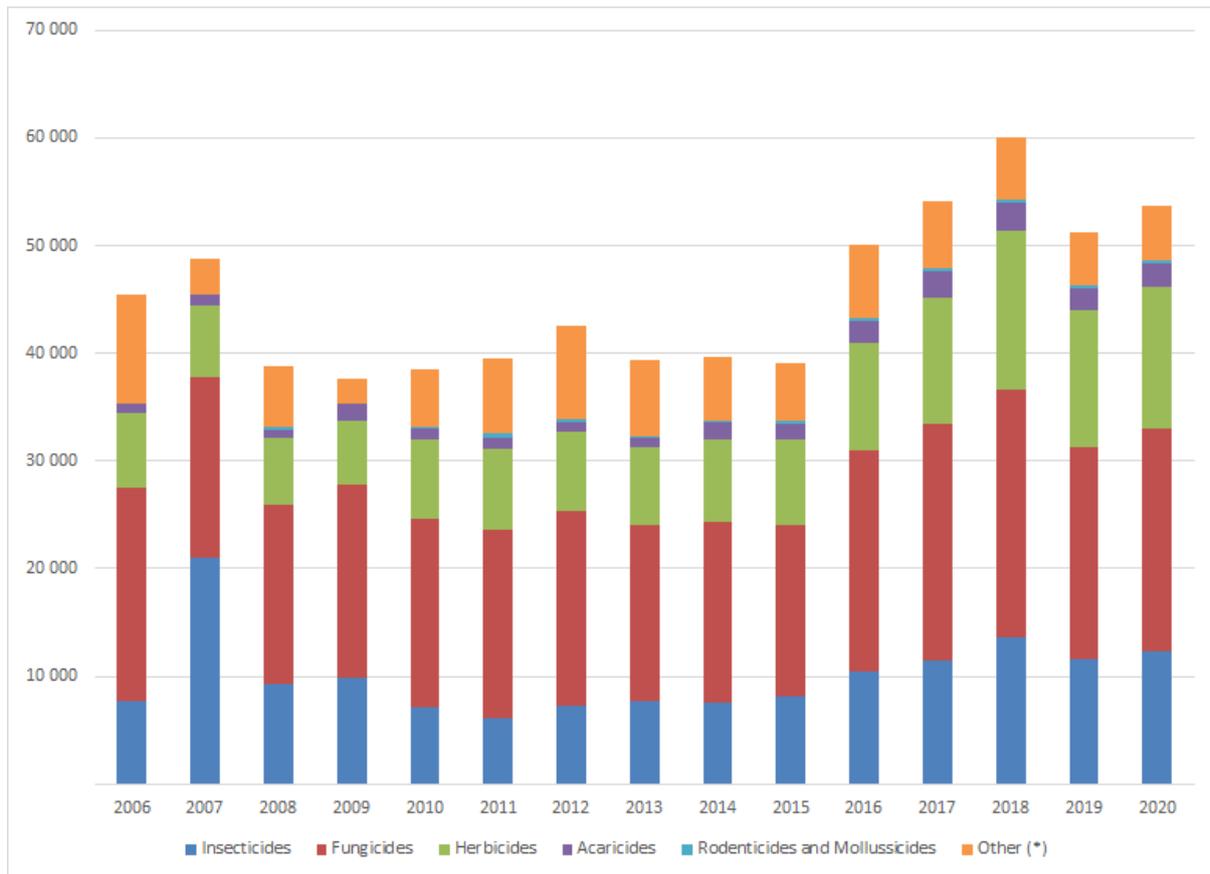


Figure 15. Pesticide Use in Turkey, 2006-2020

Source: TURKSTAT, 2021

(*) Other include plant activator, plant growth regulator, insect attractant, fumigant and nematicide.

The fertilizer uses between years 2005-2019 has significantly increased in Turkey as seen in Figure 16.

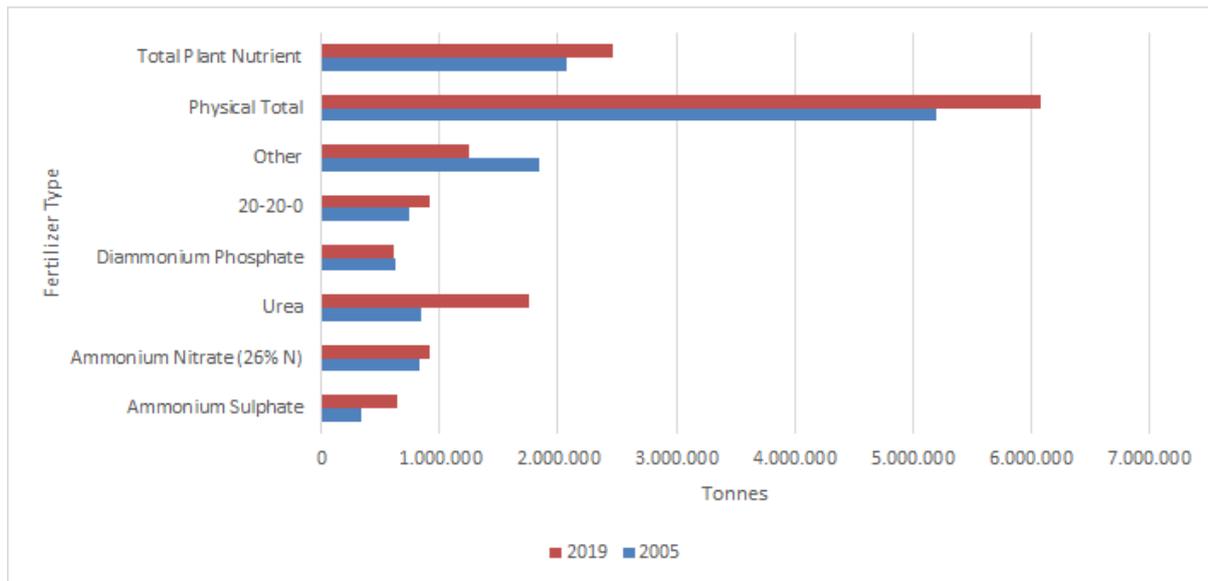


Figure 16. Fertilizer Consumption (tonnes), 2005-2019

Source: MoAF, 2020b

Climate Change

Negative effects of climate change on agricultural production due to decrease in water resources, increase in temperatures, extreme meteorological events, deterioration of ecosystems, increase in erosion, decrease in biodiversity, and deterioration in soil at national scale are profoundly felt in agricultural production.

Migration from rural to urban areas, rapid urbanization and industrial pressure, rapid population growth, expansion of agricultural area and tourism activities and excessive use of natural resources pose a serious risk in terms of food safety.

The national Climate Change Strategy 2010-2023 outlines short-, medium- and long-term objectives as the basis for actions to tackle climate change, and the Strategy's goals include climate change mitigation and adaptation. The Ministry of Environment and Urbanization supervised development of the NCCAP in 2011 to enable implementation of the Climate Change Strategy.

Figure 17 shows the change of greenhouse gas emissions in the years of 1990-2019. Greenhouse gas emissions increased by 130 % in between those years. The biggest change occurred in energy sector with an increase of 264 %.

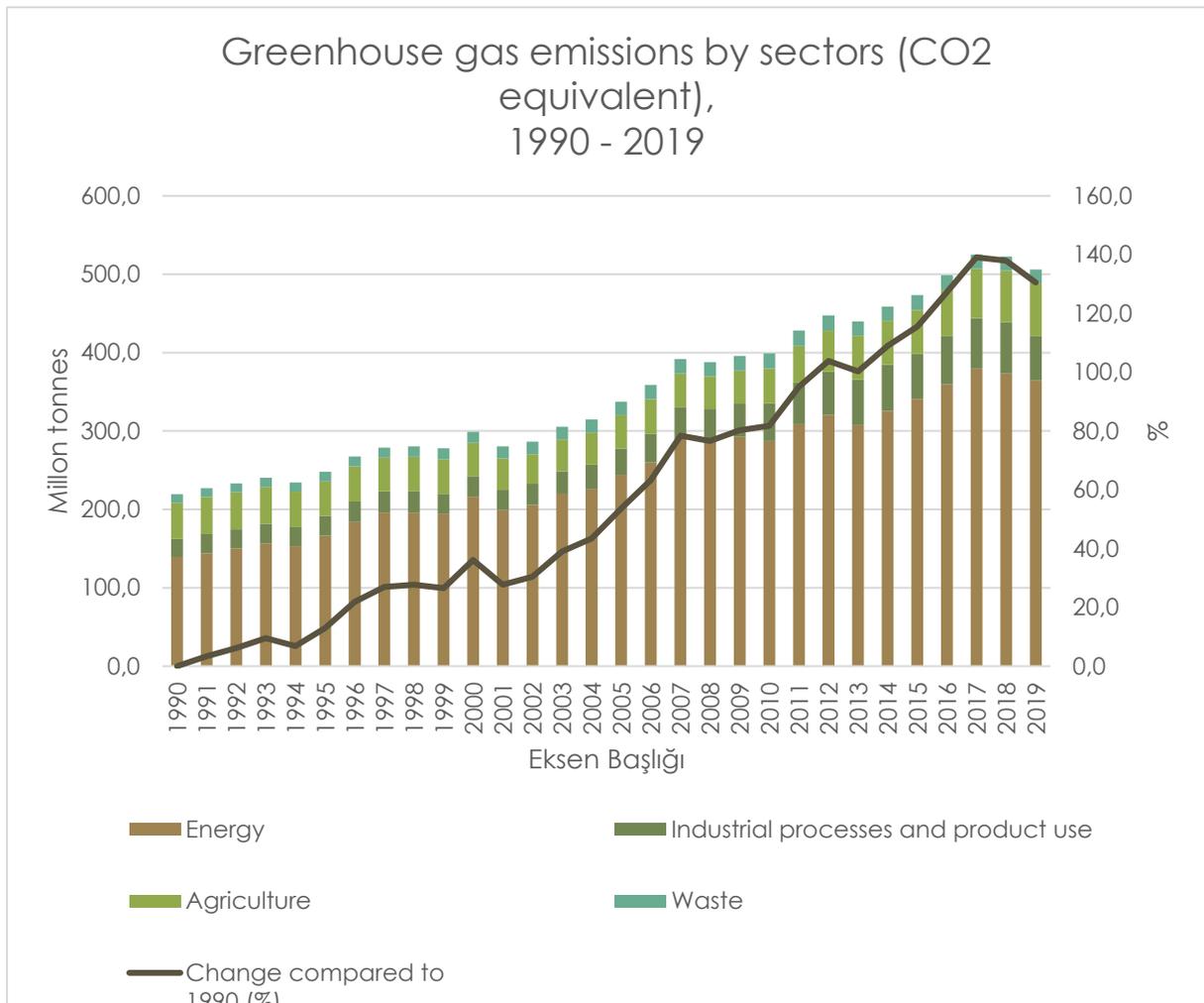


Figure 17. Greenhouse Gas Emissions by Sectors (CO₂ equivalent), 1990-2019

Major agricultural elements causing emissions in the agricultural sector are enteric fermentation, manure management, and agricultural soils which account for more than 95% of the emissions as indicated in the figure 18. The biggest category in the agriculture sector in relative terms is enteric fermentation with a percentage of 49.4 for 2018.

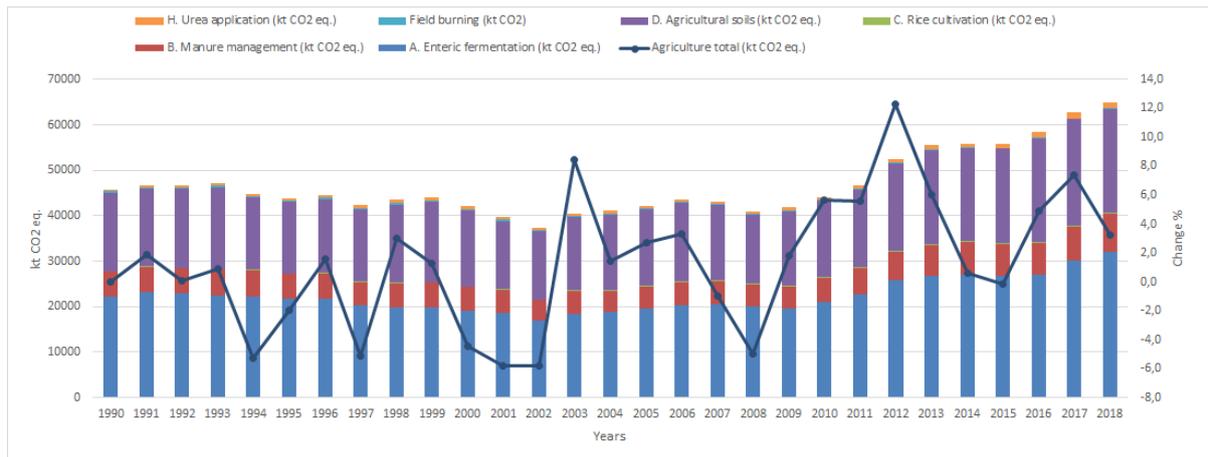


Figure 18. Overview of Agriculture Sector Emissions, 1990-2018

Source, TURKSTAT, 2021

One of the methods of reducing methane gas emissions in enteric fermentation is to use feeds more efficiently in livestock. In addition, reduction of emissions from enteric fermentation with special additives to be added to the feed and long-term management changes, improved nutritional practices such as the addition of certain oils or oil seeds, probiotics and proteins to the food and emission reduction with special nutritional additives are considered as other effective methods. Biogas production and composting in manure management, emission reduction by conducting soil analyses and continuing soil analysis support, increasing soil carbon sequestration capacity with compost applications and increasing no-till farming practices could be applied to combat climate change. The current national policies support companies in order to sort out the food industry wastes sent to biogas plants from their packaging.

Growing population, industrial development, growing urbanization and thus rising amount of wastes put pressure on natural resources. Particularly, climate change leads to major changes in water quality and quantity. Overpopulation especially in water-scarce regions; growing rural depopulation; food security; rising socio-economic conditions; agricultural, domestic and industrial pollution, changing rainfall patterns caused by the global climate change affect all elements of the hydrological cycle. The lack and inefficient use of water has caused droughts, soil salinity and pollution, land subsidence and rural exodus.

Water management affects energy politics, the environment, public health, nature conservation and food security. For these reasons, the damage caused by climate change should be seriously addressed and water management systems should be adapted to new conditions.

Water management has traditionally been deemed in two dimensions: supply and demand management. Yet, for sustainable water management two other dimensions should be integrated as well, namely: resource management and risk management also taking elements like water quality, climate change and drought and flood management into consideration. Determining optimum plant patterns according to water resources and designing support programs considering water constraints are essential concerning climate change.

Sectoral Water Allocation Plans (SWAPs) are prepared to ensure the sharing of water resources at basin and sub-basin scale, to plan for the future by considering climate change such as the drought

conditions that Turkey faces and to meet the water needs of each sector in a sustainable, efficient, fair and equitable way. SWAPs are a scenario-based evaluation of water resources that considers the usable water potential of the basin, the needs of each sector such as the agricultural sector (which uses 76.7 percent of the total water potential of Turkey) and the economic outputs of water use of the sectors under the changing socio-economic and environmental indicators.

It is crucial to allocate the water properly to the agricultural sector, which is the most vulnerable sector. In order to improve the resilience of the agriculture sector in Turkey, in SWAPs; water demand projections for the agricultural sector are determined depending on the crop pattern, irrigation efficiency and irrigation areas. The water needs of the crops are calculated according to full and limited irrigation, and crop pattern optimization is performed under normal and drought conditions. SWAPs identify optimised crop patterns that would minimise the water deficit during drought periods and, at the same time, ensure the continuity of agricultural production and farm incomes. The technical process of SWAPs points out and mitigate potential vulnerabilities of the agriculture sector to have more reliable and resilient and sustainable water allocation.

Figure 19 shows that level of floods in Turkey is more than world average, while drought is lower than world average. The risk of cyclone is too low when compared with world average.

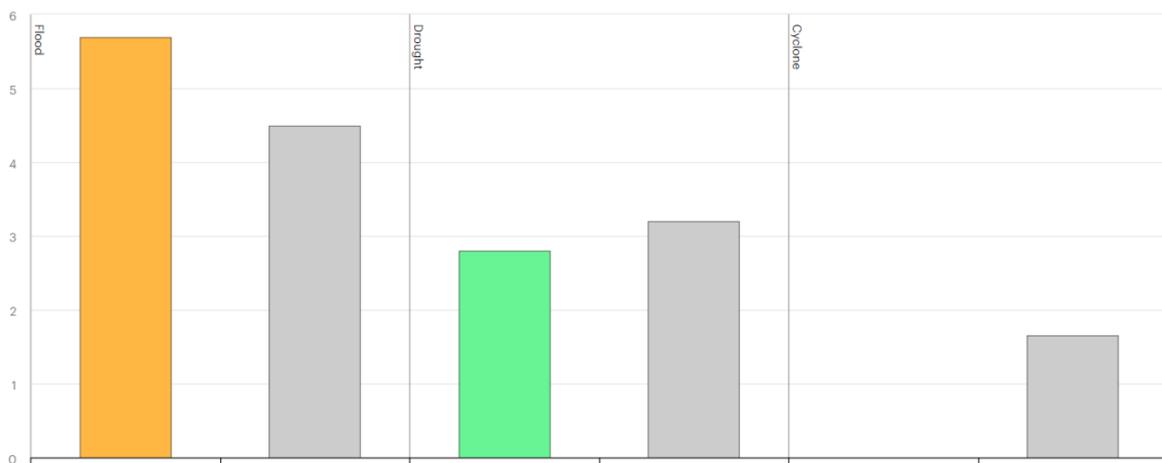


Figure 19. Level of floods, drought and tropical cyclones in Turkey, 2000-2020

● Low ● Medium ● World average

Source: IEA, 2020

Level of warming in Turkey in the last two decades, as shown in figure 20, increased by an average 0,06 °C/year.

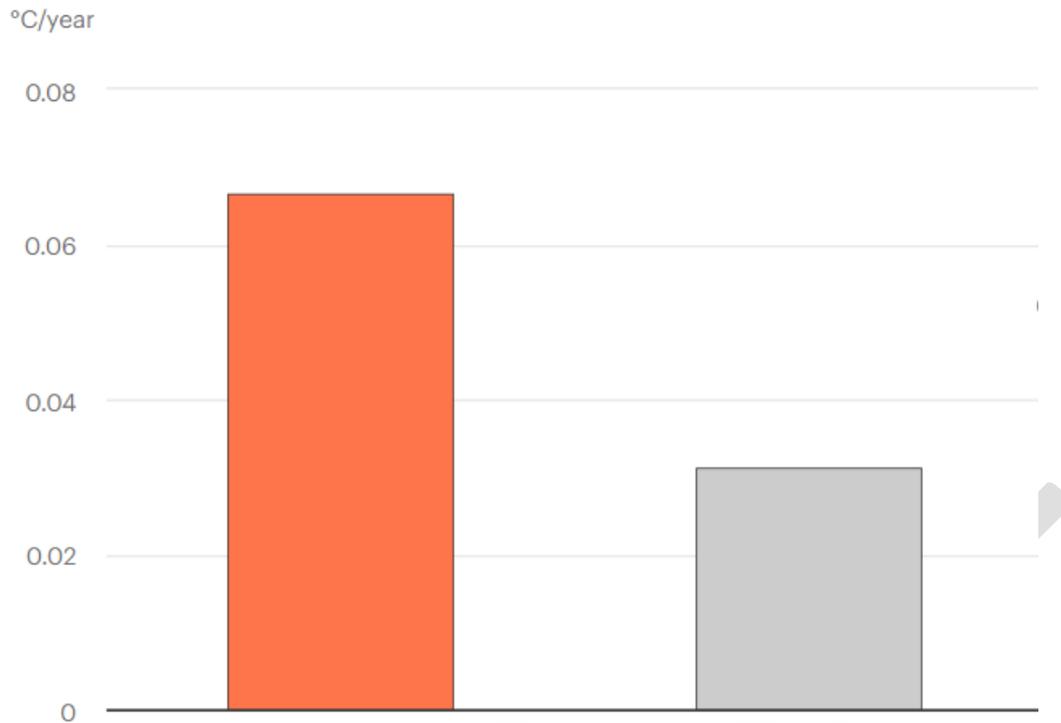


Figure 20. The level of warming in Turkey, 2000-2020

● High ● World average

Source: IEA, 2020

Figure 21 refers to Turkey's mean temperature anomalies in summer. As seen clearly, the mean temperatures significantly increased year by year.



Figure 21. Turkey Mean Temperature Anomalies in Summer*⁶

Source: MoAF, 2021

The figure 22 shows the shallow groundwater levels in Turkey from January 2021. The excessive use of groundwater, particularly in agriculture sector bring serious risks for agricultural production.

⁶ [Mevsimlik Sıcaklık Analizi - Meteoroloji Genel Müdürlüğü \(mgs.gov.tr\)](http://mgs.gov.tr)

The calculated groundwater reserve of is 23 billion m³, and the safe groundwater reserve is 18 billion m³. Technically and economically consumable surface and underground water potential of Turkey is 112 billion m³. With approximately 1,400 m³ of usable water per capita, Turkey is among the countries with water restrictions, and in 2030 it is forecasted to be 1,120 m³/year per capita. With the amount of water available, it could become a water-scarce country (The Ministry of Development, 2018).

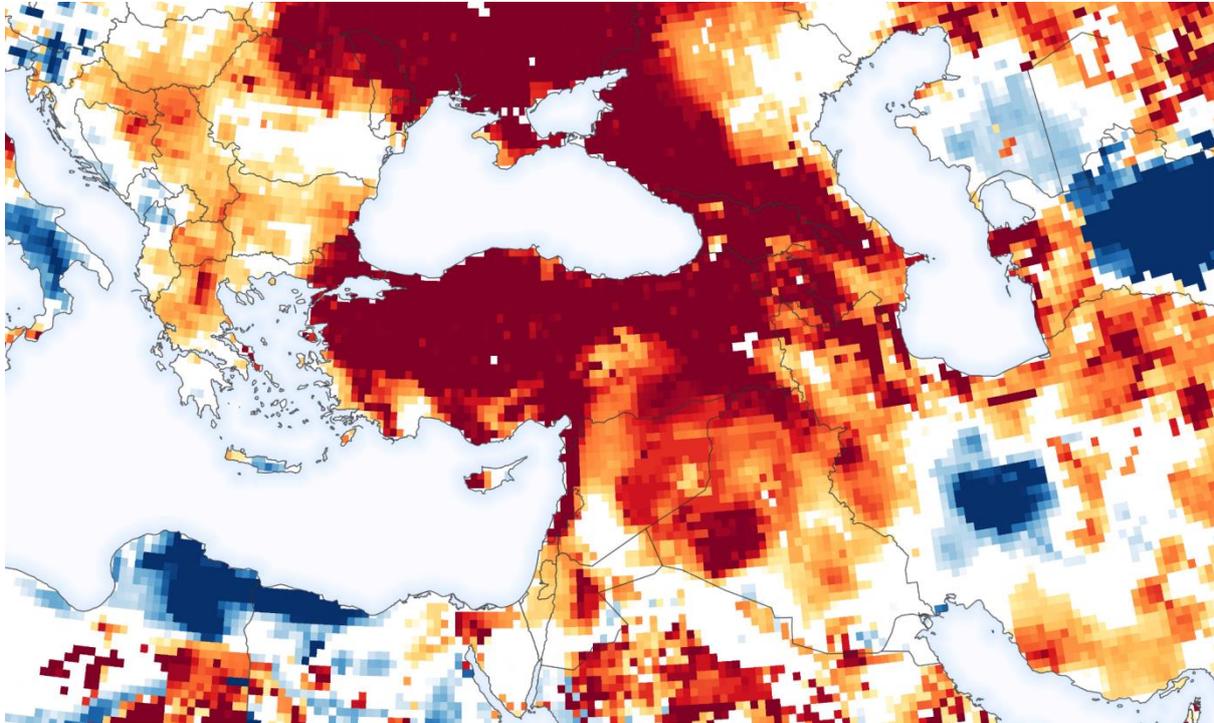
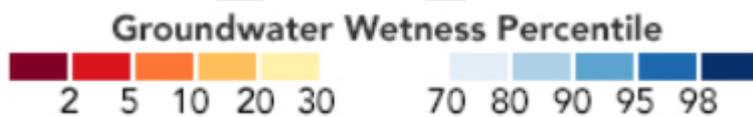


Figure 22. Groundwater Levels of Turkey



Source: NASA, 2021

5. KEY INTERVENTION AREAS FOR NATIONAL PATHWAY

Mitigating the effects of COVID 19 are very needed to ensure food security and that nutritional needs of all individuals, particularly of vulnerable ones are met (such as social protection measures, breastfeeding, infant and young child feeding, healthy diets consumption, true info on diet-related diseases etc). Also, food systems should be shaped with the aims of being more resilient to the shocks, natural disasters and being financed in a more optimum ways, eliminating poverty and inequalities, physical access to the food for all with the affordable prices, improvement of agri-food trade that are negatively affected by COVID-19. Better governance and coordination between not only national and also regional and global actors should be ensured towards improvement of food systems. In particular, during national dialogues the UN Turkey`s supports have oriented towards provision of specialised expertise in development of the national pathway preparation process. In line with Agenda 2030 and SDGs and in alignment with the United Nations Sustainable Development Cooperation Framework (UNSDCF 2021-2025), through a collaborative approach, the UN in Turkey will further support in implementation of the prioritized tracks of the national pathways in the areas of policy analysis/development, knowledge transfer, capacity development, outreach and advocacy in an effort to further strengthen the national food systems.

Turkey preserves its commitment to perform actions and main actions as a result of the 3rd Agriculture Forestry Council in line with the Summit. Turkey also committed to perform actions and main actions to be identified as a result of the Water Council Declaration in line with the Summit (MoAF, 2021c).

Table 2. Key Intervention Areas

Action Tracks	Targets*
Action Track 1: Ensure Fair Access to Safe and Nutritious Food for All	Developing Fair Access to Safe and Nutritious Food, particularly for Vulnerable Groups
	Improving Public Health, Food Safety and Strengthening Inspections and Controls with Innovative Methods
Action Track 2. Shift to Sustainable Consumption Pattern	Encouraging the Sustainability Supply And Value Chain In Agri- Food Sector And Reducing Food Loss And Waste
	Raising Consumer Awareness and Promoting Sustainable Consumption
Action Track 3 (AT3): Boost Nature Positive Production At Sufficient Scale	Improving Climate Change Compatible Production Models
	Efficient Use of Water Resources
	Sustainable Use of Natural Resources
Action Track 4 (AT4): Equitable Livelihoods	Development of More Inclusive Policy and Measures for Disadvantaged Groups (such as women, youth, seasonal

Action Track 5 (AT5): Build Resilience To Vulnerabilities, Shocks & Stresses	workers, people under temporary protection, children etc.) in agri-food sector
	Increasing Rural Vitality
	Building Resilience of Food Systems against Climate Change, Natural Disasters and Unexpected Crisis

Main targets of Turkey's National Pathway are explored below with priorities and key intervention area emphasized. Concrete actions under the main targets of National Pathway, on the basis of online-surveys, workshops, 3rd Agriculture-Forestry Council and other relevant strategic documents are also identified in accordance with actions tracks and these actions are given in Appendix 1.

- **Developing Fair Access to Safe and Nutritious Food**

Turkey will continue of school nutrition, school meal and school food programs. Turkey also promote local products with geographical indication. providing healthy and safe food at affordable prices, implementation of measures to prevent food price fluctuations, digitalising food value chain and increasing the accessibility and transparency of all stages of the food value chain for producers and consumers, dissemination of bio-economy and circular economy approaches, conducting R&D and P&D to extend the shelf life of foods and to expand their use and promoting the alternative staple foods for a healthy and balanced food consumption instead of a single type of food are key priorities under this target.

- **Improving Public Health, Food Safety and Strengthening Inspections and Controls with Innovative Methods**

Turkish Food and National Research Program focuses on food-feed safety and quality, Using modern techniques in food and feed production and product development, development of food-feed storage and packaging techniques, application of new methods in food and feed analysis, valorisation of food wastes and traditional foods.

Transforming food systems to more sustainable ones requires a long-term focus and a coherent set of commitments and actions. The challenges of malnutrition, health and the environment are all fundamentally interlinked. Policy coherence in these areas needs to be strengthened.

The main priorities under this target is development of food traceability infrastructure through the widespread use of digital technology and solutions and monitoring pesticide residues, effective and rapid intervention with counterfeiting and adulteration in food products, establishing more effective monitoring and surveillance systems for fishing and promoting aquaculture and training of all key actors in the food supply chain on food safety and quality management systems.

- **Encouraging the Sustainability Supply and Value Chain In Agri- Food Sector And Reducing Food Loss and Waste**

Developing and supporting more robust climate finance mechanisms for small-scale food producers is highly critical for the sustainability of the food chains. In addition to the farmers, livestock keepers, fishers, food processors, forest villagers are also member of this group who are very fragile towards socio-economical shifts with very low income.

The harvest and post-harvest loss are over 10 % in Turkey. Reducing food losses and waste significantly contributes to ensuring food security. The most comprehensive initiative which covers all sectors and all food products and also handle food banking practices for reducing food loss and waste by the Republic of Turkey is the Save Your Food Campaign. In May 2020, Turkey launched Save Your Food Campaign in cooperation with FAO. Turkey also made a Guinness Record for the most promised campaign in the field of environmental sustainability on reduction of food loss and waste. “Preventing Bread Waste Campaign” was launched on 17 January 2013 by our President, Mr. Recep Tayyip ERDOĞAN, on a national scale, in order to prevent bread waste and economic losses caused by wastage, to promote the consumption of healthier whole wheat bread, and to raise social awareness on these issues. According to the results of the research conducted to evaluate the results of the campaign, the waste of bread, which was 5.95 million loaves per day, was reduced to 4.9 million loaves per day with the effect of the Campaign. Thus, 1 million 50 thousand loaves of bread per day and 384 million loaves of bread per year were saved from being thrown away.

Turkey will maintain to raise awareness of consumers through social media and other tools in order to combat food waste. The main priorities are to reduce, to prevent and to manage FWL effectively at the consumption level. Shortening food supply and value chain by developing the necessary technological infrastructure and block chain applications including the monitoring and evaluation systems to ensure the cold chain in food products will be another focus under this target.

- **Raising Consumer Awareness and Promoting Sustainable Consumption**

Turkey conducted a Healthy Nutrition and Physical Activity (PA) Programme. Prevention on Childhood Obesity and Physical Activity Action Plan prepared by the Ministry of Health with a multi-sectoral approach is implemented. The Nutrition Friendly Schools Program is carried out in Turkey in collaboration with the Ministry of National Education and the Ministry of Health and with the “Nutrition-Friendly School Project”, it is aimed to increase the awareness of healthy nutrition and active living in schools and to improve school health by supporting good practices in this regard. In accordance with the cooperation protocol signed between the Ministry of National Education and the Turkish Standards Institute (TSE), efforts are underway to develop a standard way to measure the quality of nutrition and to monitor the growth and development of school-age children with the "Control Guide for Developing Healthy Eating Habits and Increasing Physical Activity in Educational Institutions". An Erasmus+ project entitled as “Increasing Food Literacy Competencies of Adults (2020-2022)” has been carry out by General Directorate of Agricultural Research and Policy. In this project, the target group of people who are retired people, housewives, and even unemployed people who are desperate to contribute house income by cooking and selling their products will benefit from food literacy education for adults. Furthermore, they can acquire self-efficacy and will be able to make healthier eating choices, or they will improve the economy by creating more job opportunities.

Turkey will continue to raise awareness of consumers through social media and other tools in order to combat food waste in collaboration with national and global actors to prevent misinformation in nutritious food. Increasing average consumption level for blue foods, decreasing food-borne diseases (including combat against obesity, malnutrition, micronutrient deficiency especially in vulnerable groups), raising consumer awareness and promoting sustainable consumption and increasing food literacy are the main priorities. Diversifying the diets in the following decade will be important regarding agriculture and health policies.

- **Improving Climate Change Compatible Production Models**

Increasing use of smart technologies in agriculture along with disseminating digitalization among agri-food system actors is another crucial milestone that the pathway intends to achieve. Turkey has shown great improvement in digital access. Turkey ranks 5th in digital access out of 150 countries for improvements in network coverage, performance, and availability. 97% of inhabitants have mobile subscriptions. This coverage rate presents many opportunities to integrate digital solutions to Turkey's food system. Under MoAF coordination several national data sets and the digital services established and used for improving agricultural service, including: National Geographic Information Systems, Farm Accountancy Data Network, Land Parcel Identification System, Integrated Management and Control System, Agricultural Information Network, Farmer Registration System, Animal Registration System, Farmland Registration System and Village Database. These systems also support product verification and tracking, national research programs, map and satellite imagery production, and other key Ministry operations. Turkey will thus be continuing the improvement of those data sets and establishing needed ones will benefit all stakeholders along the value chain, increasing efficiency, equitability, and profitability of food systems while simultaneously reducing environmental impact.

Turkey will continue to conduct research and modelling studies on the short, medium and long-term effects of climate change on food supply. Turkey will continue research activities to determine the effects of climate change on crop production and livestock on the basis of agricultural basins. Determining the product pattern that will increase agricultural output by optimizing the use of resources, identifying plant species and varieties suitable for agricultural basins, planning the most suitable fertilization and irrigation methods according to the climate and soil demand and sharing them with the farmers, conservation of biodiversity and animal gene resources, development of new animal breeds with high adaptation to climate change as well as dissemination of local varieties resilient to climate change and carrying out the production processes in accordance with climate change and ensuring their sustainability by reviewing the agricultural calendar are the key priorities. Turkey will also continue to disseminate organic agriculture and good agricultural practices by including bio-economy, biomass and circular economy approaches with firm steps.

- **Efficient Use of Water Resources**

Saving water in the agricultural sector, which uses approximately 74% of the water potential in Turkey, is one of the most important priority policies of Turkey for the effective, efficient use and sustainable and resilient management of water resources by considering the balance of

protection and use. The dissemination of pressurized closed system modern irrigation projects comes to the fore as the most effective way of saving water used for irrigational purpose. On the other side, every change in the amount and quality of water affects agricultural production.

The Blue Peace Initiative in the Middle East is a regional initiative established in 2009 with the vision of water as a means of cooperation, and its member states are Iraq, Lebanon, Jordan, Turkey Syria and Iran. Prince Hassan Bin Talal of Jordan is chairman of the Policy Advisory Board and chairs the board of directors. As of 2019, Turkish Water Institute has been the "Coordination Center" of the initiative. WATERMED 4.0 (2019-2022) project aims to increase the amount of water (conventional/alternative water sources) used in agriculture in the Mediterranean, which is expected to be significantly affected by climate change, to a more efficient and sustainable point by introducing smart technologies. Within the scope of project which is titled as "Obtaining Drinking Water by Treating Dirty Water with Low Cost and Efficient Solar Energy", a drinking water disinfection system with very low cost and simple technology has been developed for poor countries (especially for Africa) that are experiencing water stress due to the increasing population and climate change.

The water council was created by the Ministry of Agriculture and Forestry with public, private and representations from universities and NGOs. Turkey targets to open irrigated land for 2 million hectares in 2018-2023 as indicated in the 2023 vision. This will be quite important for the productivity of agricultural land. Turkey will continue to invest in modern irrigation techniques through rural development grant programs. According to targets of Water Council, Water Efficiency Strategy Plan and Basin Based Water Efficiency Action Plans will be prepared. Taking measures to prevent water loss and waste and raising awareness on optimum water use in target groups, efficient use of water sources including ground water and preventing water pollution, and calculating water foot print for agricultural products, expanding of irrigation of economically irrigable lands with modern irrigation methods, by providing remote control and automation of irrigation facilities with digital technologies are key priorities.

- **Sustainable Use of Natural Resources**

Turkey will continue its efforts on land consolidation which will make a remarkable contribution to the transformation of food systems in Turkey. By using the monitoring systems developed by the Ministry of Agriculture and Forestry, identifying agricultural areas sensitive to erosion and applying erosion control methods more effectively in these areas, efficient use of renewable energy, reducing erosion by extending methods such as terracing and planting, updating the national basic soil maps and accordingly preparation and follow-up of land use and production plans, establishment and support of production stations for fauna are key priority areas.

- **Development of More Inclusive Policy and Measures for Disadvantaged Groups (such as women, youth, seasonal workers, people under temporary protection, children etc.) in Agri-Food Sector**

Turkey will continue to invest in farming activities conducted by small holders. Turkey implements a young farmer programme in order to mitigate rural migration and ensure natural

habitat. This program supports real persons between the ages of 18-40, residing/wanting to reside in rural areas and engaged in/wanting to display agricultural activities. Turkey will maintain policies to empower women working in the agriculture sector. Adapting existing social protection policies and developing new social policies to register informal workers and to prevent hidden unemployment and diversification of decent work opportunities in rural and agricultural food sectors in disadvantaged groups, especially youth and women are among key priority areas. Turkey will disseminate digital literacy and use of smart applications among smallholders and women and youth of rural areas via custom training programs and support mechanisms. Soup-Kitchen for elderly, disabled, homeless and diseased people who have difficulty in accessing nutrition will also be continued with national and local administrations.

- **Increasing Rural Vitality**

Rural poverty and absence of financial and social incentives continue to stand as one of the major reasons behind rural-urban migration causing also problems for urban development. The 1st objective of the 2019-2023 Strategic Plan of our Ministry is to increase the welfare of rural people in the rural area, to ensure a stable food supply by increasing the yield and quality in agricultural production. Reducing rural to urban migration, improving access to finance for small farmers and cooperatives, small businesses, decreasing the rural poverty by diversifying alternative income methods such as inland fisheries, handicraft works, agro-based industry and rural tourism including local food culture and local cuisine in rural areas and increasing the number of geographical indications by preserving traditional production methods for local products and local cuisine and strengthening its position in supply chains.

- **Building Resilience of Food Systems against Climate Change, Natural Disasters and Unexpected Crisis**

Turkey invests in e-commerce applications for virtual marketing (DİTAP-Digital Agriculture Platform) and accelerating digital transformation in agriculture by developing innovative management models and strengthening vertical and horizontal cooperation and R&D infrastructure. Development of land ownership, land banking, community-based mechanisms, building resilience of food systems to climate change and natural disasters, review of measures against loss of income and breakdown in food supply due to loss of livelihoods as a result of COVID-19 and strengthening food security for other emergencies, ensuring food supply resilience against future crises by encouraging urban farming activities including vertical farming practices against climate change, where more crops are obtained by using 95% less water, promoting sustainable agriculture, ensuring sustainability and maintaining competitiveness in agriculture by minimizing the effects of climate change and drought, adapting to climate change, water management, strengthening environmental resilience, Accelerating digital transformation in agriculture by developing innovative management models, cooperation and R&D infrastructure, increasing the crop resilience, enhanced network, cooperation and governance between national and international actors, reinforced measures and insurance system with building up meteorological forecast systems, early warning systems and registration in agriculture), improvement of supply management system on agricultural inputs are among key priority areas.

As a result, ensuring the efficiency and sustainability of agricultural production with innovative methods, improving sustainable food systems with reliable food supply and healthy consumption, developing new models resilient to climate change by benefiting digitalization, highlighting the importance of vulnerable groups will be key objectives under the targets of Turkey's National Pathway. These vertical targets identified in transformation of Turkish food systems will be supported by horizontal targets such as digitalization, agricultural extension and cooperation among local, regional, national and international organizations.

6. NATIONAL PATHWAY IN CONNECTION WITH SUSTAINABLE DEVELOPMENT GOALS

Sustainable food systems do not only contribute to reaching the “zero hunger” goal but also are important for achieving critical progress on all Sustainable Development Goals (SDGs). How food systems contribute to each SDG is explained by the UN in relation to the Food System Summit and here the relation is summarized according to the UN's mentioned approach.

Sustainable food systems contribute to achieving

- SDG 1, by creating good jobs, improving access to food, and supporting healthy communities.
- SDG 2, by rebuilding food systems to make them more sustainable, productive, and resilient, which is essential for solving long-term hunger challenges and managing acute shocks, like disease outbreaks and climate extremes.
- SDG 3, by supporting adequate nutrition, which helps people of all ages to achieve good health.
- SDG 4, by enabling students to have a healthy and balanced diet, which is critical to success at school.
- SDG 5, by empowering and supporting women and bolstering their livelihoods around the world.
- SDG6, by ensuring the sustainable use of water resources and increasing access for those who do not have drinking water, while also reducing the amount of pollution in natural water systems.
- SDG7, via investments in sustainable food systems that maximize the use of clean and renewable sources of energy will reduce the food sector's environmental impact and improve people's access to clean and affordable energy.

- SDG8, by creating decent jobs and supporting the incomes of billions of people around the world.
- SDG9, by scaling up innovations and investing in infrastructure, sustainable food systems can deliver widespread benefits to people and the planet.
- SDG10, by reducing poverty and providing decent work and a good income.
- SDG11, by helping ensure that city dwellers everywhere have purchasing power and are adequately nourished.
- SDG12, by reducing waste and spoilage and empowering consumers to make smart choices in their food shopping.
- SDG13, by lowering emissions of critical climate-warming gases, including methane and carbon dioxide.
- SDG14, by ensuring the long-term viability of the world’s fisheries, while also protecting the health of the ecosystems that host them.
- SDG15, via sustainable agriculture which can reduce deforestation and support healthy terrestrial ecosystems, while also providing critical sustenance to people around the world.
- SDG16, by reducing critical stresses facing families, communities, and nations around the globe, preparing the ground for peace and strong institutions to take hold.
- SDG17, by delivering tangible benefits to communities around the world.

Thus, targets and related actions suggested under each action track to transform Turkey’s food systems into a sustainable and resilient structure will decrease the distance for the country to achieve the SDGs. Table 3 shows how Turkey’s national pathway targets relate with SDGs.

Table 3. Connection Between National Pathway Targets and SDGs

Action Tracks	National Pathway Targets	SDGs (on which National Pathway Targets have impact)
AT1	Developing Fair Access to Safe and Nutritious Food, Particularly for Vulnerable Groups	SDG 1: No Poverty SDG 2: Zero Hunger SDG 3: Good Health and Well-being SDG 10: Reduced Inequality
	Improving Public Health, Food Safety and Strengthening Inspections and Controls with Innovative Methods	SDG 2: Zero Hunger SDG 3: Good Health and Well-being
AT2	Encouraging the Sustainability of Supply and Value Chain in Agri- Food Sector and Reducing Food Loss and Waste	SDG 3: Good Health and Well-being SDG 10: Reduced Inequality SDG 11: Sustainable Cities and Communities SDG 12: Responsible Consumption and Production

	Raising Consumer Awareness and Promoting Sustainable Consumption	SDG 3: Good Health and Well-being
AT3	Improving Climate Change Compatible Production Models	SDG 9: Industry, Innovation and Infrastructure SDG 11: Sustainable Cities and Communities SDG 13: Climate Action SDG 14: Life Below Water SDG 15: Life on Land
	Efficient Use of Water Resources	SDG 6: Clean Water and Sanitation SDG 7: Affordable and Clean Energy SDG 9: Industry, Innovation and Infrastructure
	Sustainable Use of Natural Resources	SDG 7: Affordable and Clean Energy SDG 9: Industry, Innovation and Infrastructure
AT4	Development of More Inclusive Policy and Measures for Disadvantaged Groups (such as women, youth, seasonal workers, people under temporary protection, children etc.) in Agri-Food Sector	SDG 1: No Poverty SDG 4: Quality Education SDG 5: Gender Equality SDG 8: Decent Work and Economic Growth SDG 10: Reduced Inequality SDG 16: Peace and Justice Strong Institutions
	Increasing Rural Vitality	SDG 8: Decent Work and Economic Growth SDG 10: Reduced Inequality
AT5	Building Resilience of Food Systems against Climate Change, Natural Disasters and Unexpected Crisis	SDG 2: Zero Hunger SDG 9: Industry, Innovation and Infrastructure SDG 11: Sustainable Cities and Communities SDG 13: Climate Action SDG 17: Partnerships to Achieve the Goals

TURKSTAT in Turkey is responsible for monitoring of the indicator system of the 2030 Agenda for Sustainable Development, compiling the data, publishing it through an appropriate distribution channel, encouraging the production of unproduced indicators, as well as ensuring communication and coordination with national stakeholders and international organizations.

7. PARTICIPATORY APPROACH IN THE FOOD SYSTEM

To realize changes to advance sustainable food systems, a holistic and coordinated approach is required from farm to fork through all processes of the agri-food sector value chain. Thus, involvement and commitment of diverse stakeholders including policy makers, public authorities, civil society, academics and the private sector is crucial for this transformation to occur effectively. Turkey's process to draw the national pathway has been built upon a participatory approach and fed by national plans and strategies that are committed by governmental bodies. Various participatory actions including focus group meetings, inclusive survey applications and workshops, in all of which relevant and diverse stakeholders actively contributed, are held in the National Dialogue Process. Upon outputs of these stakeholder engaged activities, national action plans and strategy plans are integrated in the process. In determining the problems-intervention areas, solution suggestions and actions for the improvement of sustainable food systems, the 3rd Agriculture Forestry Council Final Declaration and the actions containing concrete commitments and the preparatory work carried out within the scope of the Summit were taken as the basis. Other national plans drawn by ministries such as MoAF, MoH, MoFSS, and MoENR are also integrated in the national pathway. These plans are also results of participatory processes. Generally, groups of core expert representatives of the relevant institutions on the related subject under the coordination of the Ministry responsible for the action plan, take place in the preparation process and the draft plans are opened to the official opinions of public and private stakeholders. Thus, the national pathway and other national plans and strategies that reinforce the pathway benefitted from intense stakeholder participation and commitment.

In order to realize pathway's targets, many different actors across the food systems need to be brought together as was the case in the preparation process. Obvious actors of the process such as policy makers, public authorities, civil society, academics and the private sector have different capacities to participate but also actors which have less chance to be heard such as women and youth are also needed to be integrated in the implementation phase in order to increase coherence and inclusiveness. These actors need to work together in a systematic way to increase the impact of the pathway actions. As Turkey already takes roles in and contributes to projects and collective studies with international organizations, continuing these international collaborations and involvement of new relevant international organisations and agencies to pathway's implementation is important to increase the effectiveness and impact of the system. Upon this collective effort, the national pathway to change food systems to be better could be realized.

8. REINFORCING THE PATHWAY WITH OTHER PLANNING DOCUMENTS

National Pathway is a result of both assessments of outputs from the National Dialogue Process and measures and actions that are already determined in a national strategy or a plan that is related with food systems. Main framework of Turkey's policy, strategy, action plan, project, support documents regarding sustainable food system including national pathway is based on National Development Plans at national level in addition to international agreements, conventions and memorandums of understanding. These national plans which led to derivation and dedication to many actions for national pathways includes; the 11th Development Plan covering the period of 2019-2023, the Economic Reform Package of 2021, the New Economy Program covering the period of 2019-2021, the Strategy Plans of the Ministry of Agriculture and Forestry covering the period of 2019-2023, outputs of the 3rd Agriculture Forestry Council, Turkey's National Strategy Plan On Prevention, Reduction And Monitoring Of Food Loss And Waste And Its Action Plan, National Energy Efficiency Action Plan (2017-2023), National Strategy and Action Plan to Combat Desertification (2019-2030), Green Deal Action Plan 2021, National Water Plan 2019-2023, National Basin Management Strategy (2014-2023) , Strategy Plan and Action Plan for Women's Empowerment (2018-2023), Climate Change Action Plan (2011-2023), Action Plan of the Ministry of Health for Prevention and Control Of Adult And Childhood Obesity And Physical Activity (2019 – 2023), National Rural Development Strategy (2021-2023) and relevant sections of strategy plans and action plans of other relevant Ministries, Investment Programs and relevant sections of other national-scale programs, policies and documents. These plans have many actions or measures that reinforce the national pathway's objectives under each action track. This integrated structure is significant in the sense that it shows the intention of transforming into sustainable food systems from many governmental agencies.

Relation of action tracks of national pathway with main national strategies, targets, actions are summarized in table of "Relationship of Turkey's National Pathway Action Tracks with Other National Strategy and Documents" in Appendix 2.

Besides commitment to national plans and programs, Turkey attaches great importance to international cooperation for the development of sustainable food systems. Turkey collaborates with many international organizations, particularly UN agencies, on the field of agriculture, food and forestry and hosts many of them at regional and office level. In that context, through partnership programs with international organizations, Turkey shares its experience and know-how with regions ranging from Central Asia to the Balkans, Caucasia and Africa.

The prominent international activities (program, projects, initiatives etc) of Turkey that lead the way for the development of sustainable food systems can be listed as such:

- Launch of an international campaign titled "SAVE YOUR FOOD" to reduce food loss and waste under the Ministry of Agriculture and Forestry in cooperation with FAO. Launching the national campaign on May 20, 2020, and implementing the sub-campaign called "I Promise that I do not waste food" on a national scale,

- Establishment of the Black Sea Economic Cooperation (BSEC) Sustainable Food Systems Regional Cooperation Center in cooperation with FAO and BSEC and undertaking the country coordinatorship of the BSEC Agriculture and Agri-Industry Working Group in the last three terms.
- Conducting of the project of “Reduction of Food Losses and Waste in the Central Asian Countries (Turkey, Azerbaijan, Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan) in cooperation with FAO, in 2020,
- Establishment of the Food Security Regional Coordination Center within the Economic Cooperation Organization,
- Organization of the “2nd Meeting of the BSEC Ministers of Agriculture” themed “Sustainable Food Systems and The Future of Aquaculture” in Turkey on May 2017,
- Hosting the 1st Meeting of the Ministers of Agriculture of Turkey-Africa and the Agribusiness Forum in 2017,
- Establishment of the “Technical Platform on the Measurement and Reduction of Food Loss and Waste” in collaboration with FAO, was initiated in the “G20 Leaders’ Declaration” during Turkey’s 20 Presidency in 2015.
- Turkey became a donor country within the scope of FAO Turkey Partnership Programs (FTFP and FTTP) and hosts the FAO-Central Asia Sub-Regional Office (FAO-SEC)
- Undertaking the Presidency of the General Assembly of the Islamic Organization for Food Security (IOFS) of the Organization of Islamic Cooperation in 2020 and carrying out the membership of the Executive Board,
- Hosting IFAD’s sub-regional office in Istanbul to develop cooperation with Azerbaijan, Bosnia and Herzegovina, Georgia, Kyrgyzstan, Lebanon, Moldova, Tajikistan, Turkey and Uzbekistan,
- Strengthening food systems and sensitive value chains related to agriculture and forestry through Agriculture and Forestry Programs carried out under the coordination of the Ministry and FAO,
- Implementation of the Project of Increasing Improvement, Income, Development and Providing Ecosystem Services, also known as the Bridges from Turkey to Africa Project, in Sudan, Mauritania and Eritrea since 2019.

9. MONITORING AND EVALUATION

In order to transform national food systems towards achieving SDGs up to 2030, identification of game changing solutions and relevant actions is an important attempt however this process needs to be complemented by an effective implementation of suggested measures and actions. Thus, monitoring and evaluation of the implementation of the pathway is crucial for assessing how close Turkey is to achieve SDGs. TurkStat in Turkey is responsible for monitoring of the indicator system of the SDGs. Since implementation of the national pathway is a collective effort of many institutions, determined as responsible or relevant for each action, monitoring and evaluation process too requires cooperative and holistic approach.

Monitoring and evaluation of the national pathway cannot be isolated from the monitoring process of other national strategy plans that are integrated in the pathway. Progress of implementation of actions cross cutting among different national documents shall be informed and shared among responsible authorities. Required coordination for gathering and assessing action's progress can be undertaken by MoAF. MoAF also runs the monitoring process of 46 main actions and their sub-actions determined and disclosed based on the results of the 3rd Agriculture and Forestry Council. These actions are monitored quarterly until the end of 2023 and the results of the implementation are announced to the public. Therefore, this monitoring process will also feed the monitoring process of the national pathway in the sense that they share common goals and action suggestions. Under MoAF coordination, national pathway implementation results can be gathered and monitored in accordance with the rules to be determined by UNFSS. Evaluation reports based on this annual process could be drawn and collective discussions regarding the necessary updates and **responsive actions** for the national pathway shall be made upon findings of these reports.

National pathway's action timeline (implementation period) reaches up to 2030. However, some actions in the pathway that are also stated in national action plans and strategies have different deadlines mostly up to 2023. For instance, 46 main actions determined and disclosed based on the results of the 3rd Agriculture and Forestry Council are committed to be completed until the end of 2023. Completion times of the actions stated in the pathway will also be assessed and revised accordingly in the monitoring and evaluation process.

CONCLUSIONS

Food systems must be in better compliance with the objective of supporting sustainable, healthy diets and achievement of the Sustainable Development Goals by 2030. Transformation of food systems needs to be done at every stage from farm to fork. This will closely be related to availability, physical accessibility, affordability, stability and desirability of improved diets.

According to The Food Security Index, Turkey is a strong country regarding proportion of population under the global poverty line, sufficiency of supply, micronutrient availability, market access and agricultural financial services, food safety, protein quality and food safety net programs. Turkey is self-sufficient in many crops and fruit and vegetables. But the losses in harvest and post-harvest are too high. Therefore, reducing FLW will contribute significantly to ensuring food security not only for Turkey but also for the needs of world.

The country report on food systems was prepared in 2019 and updated with the key national stakeholders within scope of the UNFSS. The National plan and strategies on agriculture and rural development clearly indicate that remarkable work has been conducted so far by the Ministry of Agriculture and Forestry in collaboration with other Ministries and organizations. Also, the results of the Agriculture and Forestry Council to be valid until 2023 are quite a good baseline for a well-functioned food system transformation.

Small scale farmers in Turkey are one of the most important actors of food systems when considering their strong impact in food production. To develop some financial mechanisms for small holders are essential. The environmentally friendly production made by those groups at sufficient scale are very important regarding food security. Developing marketing channels for those is also another important instrument in transformation of food systems in Turkey.

Malnutrition, ecological degradation and natural disasters are mainly borne by the public sector and society. So, policy instruments and support mechanisms will be shaped to strengthen the current situation of the environment, plant, animal and public health and also it should create decent jobs and income growths.

Evaluating and reusing the wastes released from the production processes of the factories operating in the food industry, including the fruit and vegetable processing industry, will enable the addition of minerals essential for human nutrition to the diet and the production of new additives with high antioxidant content, thus enabling the production of new foods that can help improve human nutrition. Additionally, Turkey will implement School Nutrition and School Food Programs since feeding the next generation with nutritious food will play a vital role in the sustainable food systems.

Greater resilience must be built into local and global food systems taking into consideration of COVID-19 pandemic's effects on the agri-food sector. Climate change is one of the key drivers of food insecurity. Mitigating the effects of COVID 19 are very needed to ensure food security and that nutritional needs of all individuals are met (such as social protection measures, breastfeeding, infant and young child feeding, healthy diets consumption, true info on diet-related diseases etc.). Also, food systems should be shaped with the aims of more resilient to the shocks and natural disasters. Better governance and coordination between not only national and also regional and global actors should be ensured towards improvement of food systems.

In general, small holders cannot save capital to create a viable business since they operate at low levels of resource efficiency and output. These small-scale farmers are generally risk averse and do not want to take risk for the new methods and applications. Hopefully, agricultural insurance is developing year by year and the number of beneficiaries increases at a significant rate. Moreover, Regional Development Agencies in Turkey implement some business models which includes accelerator programs that bring universities, technology firms and farmers on the same platform via matching their needs in order to increase the productivity and welfare standards of farmers. These programs seem promising for farmers including subsistence farmers as well as traditional food and machinery companies.

Also reducing food losses and waste significantly contributes to ensuring food security. For this aim, Turkey launched the Save Your Food Campaign in 2021. Turkey in the next decade will make considerable contributions to the sustainability of the global consumption and production agri-food system through the prevention, reduction and management of food loss and waste. In this context, the harvest losses and post-harvest losses will also be reduced with good practices and awareness campaigns. As indicated in the National Rural Development Strategy of Turkey covering 2021-23, small-sized enterprises will be developed, agricultural productivity will be increased, quality of life will be improved and human and social capital will be strengthened in rural areas. The level of integration of these regions with the national market and other areas will be raised and the quality of and the accessibility to education, health

including improving the level of nutrition in food, communication and local government services will be improved. The rural workforce, especially women and young people, who have left their job in the agricultural sector but continue to reside in rural areas, will be directed to agricultural or non-agricultural production activities, by cooperating with other ministries, relevant institutions and organizations.

Transforming food systems to more sustainable ones requires a long-term focus and a coherent set of commitments and actions. The challenges of malnutrition, health, and the environment are all fundamentally interlinked. Policy coherence in these areas needs to be strengthened. Expanding the production of legumes as an alternative protein source and taking more part in consumption at reasonable prices is so important for accessing nutritious food, particularly for vulnerable groups. Supportingly, “School Meal Program” is quite important in order to prevent both obesity and malnutrition in Turkey.

The regions and cities through development agencies and local administrations will be encouraged to develop their own regional food systems strategies on the basis of the National Pathway. Turkey will continue its efforts towards the achievement of the Sustainable Development Goals with all its stakeholders, and at the same time, emphasis will be placed on strengthening national, regional and international cooperation by 2030.

To sum up, in this pathway, on the basis of a very comprehensive stakeholder analysis, the strategic targets, objectives and concrete actions in line with the other strategic documents have been identified. In order to achieve these goals, put in this pathway, the food supply chain will be strengthened through infusion of technology and digitalization in agriculture services by MOAF. Increasing the productivity of small holders who are one of the weakest linkages in the food chain will be one of the main targets of this pathway. The marketing channels and accessing finance will be improved with new models. The institutional capacity of agricultural cooperatives will be improved and encouraged in the financial support mechanisms in collaboration with relevant institutions. In this pathway, digitalisation and agricultural extension are considered as cross-cutting issues that affect all processes in the transformation of Turkish food systems. Therefore, dissemination of novel agricultural practices and technological progress with the help of agricultural extension services are quite essential. In this regard, the universities will be more integrated in the extension services. Public-private partnership launched by the Ministry of Agriculture shall continue with firm steps. The programs which are currently implemented on organic agriculture and good agricultural practices will be extended all over Turkey. The new instruments which are required under the transformation of food systems will be covered in the curricula of agricultural programs. Regarding climate change, protecting natural resources applications will be improved via efficient use of groundwater, chemicals, fertilizers used in the agriculture sector will be monitored and evaluated with new systems. Under regional food systems, the cities will be encouraged to develop urban agriculture practices including vulnerable groups so as to increase access to nutritious food.

REFERENCES

Afshin, A. et.al. (2019). “Health effects of dietary risks in 195 countries, 1990-2017; a systematic analysis for the Global Burden of Disease Study 2017”, *The Lancet*, Vo.393/10184, pp. 195801972, [https://dx.doi.org/10.1016/S0140-6736\(19\)20041-8](https://dx.doi.org/10.1016/S0140-6736(19)20041-8).

Drewnowski, A. and Popkin, B.M. (1997). *The Nutrition Transition: New Trends in the Global Diet*, *Nutrition Reviews*, Vol. 55, No. 2.

Entrepreneur Information System (2021), The Ministry of Industry and Technology.

FAO (1996). *World Food Summit-Rome Declaration on World Food Security*. <http://fao.org/3/w3613e/w3613e00.htm> (accessed on 2 September 2021).

FAO. Sustainable food systems: Concept and framework. <http://www.fao.org/3/ca2079en/CA2079EN.pdf> (accessed on 29 September 2021).

FAO et al. (2018). *The State of Food Security and Nutrition in the World 2018: Building Climate Resilience for Food Security and Nutrition*, FAO, Rome, <http://www.fao.org/publications> (accessed on 13 September 2021).

FAO. 2019. *Turkey Syrian Refugee Resilience Plan 2019–2020*. Rome. 32 pp. Licence: CC BY-NC-SA 3.0 IGO.

FAO (2021). *Digital Agriculture Profile Turkey*. <http://www.fao.org/3/cb3954en/cb3954en.pdf> (accessed on 3 September 2021)

Herrero, M., Hugas, M., Lele, U., Wira, A., and Torero, M. (2021). *Shift to Healthy and Sustainable Consumption Patterns*, a paper on Track 2.

Hendriks, S., Soussana, J.F., Cole, M., Kambugu, A. and Zilberman, D. (2020). *Ensuring Access to Safe and Nutritious Food for all Through Transformation of Food Systems*, a paper on Action Track 1.

Hodson, E., Niggli, U., Kitajima, K., Li, R., Sadoff, C. (2021). *Boost Nature Positive Production*, a paper on Action Track 3.

HLPE. 2017. *Nutrition and food systems. A report by the High-Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security*, Rome.

IEA (2021). *Level of floods, drought and tropical cyclones in Turkey, 2000-2020*, IEA, Paris <https://www.iea.org/data-and-statistics/charts/level-of-floods-drought-and-tropical-cyclones-in-turkey-2000-2020>

Lynette, M.N., Huang, J., Badiane, O., Caron, P. and Forsse, L.S. (2021). *Advance Equitable Livelihoods*, a paper on Action track 4.

NASA (2021). www.turkeydroughtgws_grc_202111_lrg.jpg (3507×2110) (nasa.gov), Accessed date: 10.09.2021.

National Household Health Survey (2018). Prevalence of Noncommunicable Disease Risk Factors in Turkey 2017 (STEPS). Üner S, Balcılar M, Ergüder T editors. World Health Organization Country Office in Turkey, Ankara.

OECD/FAO (2019), "Table A.39.2 - Fish and seafood projections: Reduction, food consumption", in OECD-FAO Agricultural Outlook 2019-2028, OECD Publishing, Paris, <https://doi.org/10.1787/6e19f347-en>.

OECD (2020), *Strengthening Agricultural Resilience in the Face of Multiple Risks*, OECD Publishing, Paris, <https://doi.org/10.1787/2250453e-en>.

OECD/FAO (2021), OECD-FAO Agricultural Outlook 2021-2030, OECD Publishing, Paris, <https://doi.org/10.1787/19428846-en>

OECD (2019), Health at a Glance 2019: OECD Indicators, OECD Publishing, Paris, <https://doi.org/10.1787/4dd50c09-en>.

OECD (2021a), Meat consumption (indicator). doi: 10.1787/fa290fd0-en (Accessed on 01 September 2021)

OECD (2021b), Crop production (indicator). doi: 10.1787/49a4e677-en (Accessed on 01 September 2021)

OECD (2021c). Agricultural Policy Monitoring and Evaluation 2021, Addressing the Challenges Facing Food Systems, <https://doi.org/10.1787/2d810e01-en>.

OECD (2021d). "The contribution of the processed food sector to the triple challenge", in Making Better Policies for Food Systems. OECD Publishing, Paris. <https://doi.org/10.1787/ddfba4de-en>

Palmer, A.B., Santini, G., Dubbeling, M. and Renting, H. (2018). Validating the City Region Food System Approach: Enacting Inclusive, Transformational City Region Food Systems, DOI:10.3390/su10051680

Presidency of Strategy and Budget (2019). 11th. Development Plan, Ankara.

Presidency of Strategy and Budget (2021). Medium Term Program.

The Ministry of Development (2018). Sustainable use of soil and water in agriculture, special commission report, 11th. National Development Plan.

The Ministry of Agriculture and Forestry (2014). National Basin Management Strategy (2014-2023), Ankara.

The Ministry of Agriculture and Forestry (2017). National Drought Strategy and Action Plan (2017-2023), Ankara.

The Ministry of Agriculture and Forestry (2019a). National Water Plan.

The Ministry of Agriculture and Forestry (2019b). National Strategy and Action Plan to Combat Desertification (2019-2030), Ankara.

The Ministry of Agriculture and Forestry (2020a). “Supporting Small Farmers Thematic Working Group Workshop Report” prepared by National Rural Network co-financed by EU, The Ministry of Agriculture and Forestry.

The Ministry of Agriculture and Forestry (2020b). Fertilizer Production and Consumption Tables, Food Systems Country Report, Unpublished.

The Ministry of Agriculture and Forestry (2020c). Geothermal Greenhouse Cultivation, Feasibility Report and Investor Guide, feasibility report and investor guide, <https://www.tarimorman.gov.tr/SGB/TARYAT/Belgeler/Projeler/jeotermal%20serac%C4%B1%C4%B1k%20fizibilite%20raporu%20ve%20yat%C4%B1r%C4%B1mc%C4%B1%20rehberi.pdf>, Accessed date: 07.11.2021.

The Ministry of Agriculture and Forestry (2021a). National Rural Development Strategy (2021-2023), Ankara.

The Ministry of Agriculture and Forestry (2021b). 3rd Agriculture Forestry Council -Main Actions by 2024, Ankara.

The Ministry of Agriculture and Forestry (2021c). I. Water Council Declaration, Ankara.

The Ministry of Agriculture and Forestry (2021d). The Strategic Plan of the Ministry of Agriculture and Forestry covering the period of 2019-2023. Ankara, <https://www.tarimorman.gov.tr/SGB/Belgeler/stratejikplan.pdf> .

The Ministry of Agriculture and Forestry/FAO (2020). Turkey's National Strategy Plan on Prevention, Reduction and Monitoring of Food Loss and Waste and its Action Plan.

The Ministry of Energy and Natural Resources (2017). National Energy Efficiency Action Plan 2017-2023, Ankara.

The Ministry of Environment and Urbanization (2012). National Climate Change Action Plan 2011-2023, Ankara.

The Ministry of Family And Social Services (2018).Strategy Plan and Action Plan for Women's Empowerment (2018-2023), Ankara.

The Ministry of Health (2014). Turkey Diabet Program, Ankara.

The Ministry of Health (2017). Turkey Nutrition and Health Research, Ankara.

The Ministry of Health (2017). Turkey Nutrition and Health Research, TBSA_2017_zet_Bulgular-2vb.pdf (saglik.gov.tr), Accessed date:24.09.2021.

The Ministry of Health (2019). Action Plan for Prevention and Control Of Adult And Childhood Obesity And Physical Activity 2019 – 2023 , Ankara.

The Ministry of Health (2020). Turkey Nutrition and Health Research, https://hsgm.saglik.gov.tr/depo/birimler/saglikli-beslenme-hareketli-hayat-db/Yayinlar/kitaplar/TBSA_RAPOR_KITAP_20.08.pdf, Accessed date: 04.09.2021.

The Ministry of Trade (2018). Turkey Waste Report, https://tuketici.ticaret.gov.tr/data/5e6b33e913b876e4200a0101/Turkiye_Israf_Raporu_2018.pdf, accessed date: 05.09.2021.

The Ministry of Trade (2021). Green Deal Action Plan 2021, Ankara.

The Ministry of Treasury and Finance (2019). New Economy Program (2019-2021), Ankara.

The Ministry of Treasury and Finance (2021).2021 Economic Reform Package, Ankara.

<https://ms.hmb.gov.tr/uploads/2021/03/Ekonomik-Reformlar-Kitapcigi.pdf>

SOFI 2021. The State of Food Security and Nutrition in the World. FAO, 2021.

<http://www.fao.org/publications/sofi/2021/en/> TURKSTAT (2019). Crop Products Balance Sheet,

<https://data.tuik.gov.tr/Bulten/Index?p=Bitkisel-Urun-Denge-Tablolari-2018-2019-33740>

TURKSTAT (2020). Turkish GreenHouse Gas Inventory (1990-2018), National Inventory Report for submission under the United Nations Framework Convention on Climate Change.

TURKSTAT (2021). Agricultural Statistics, Ankara.

UN (2021), Food Systems Summit2, SDGs, <https://www.un.org/en/food-systems-summit/sdgs>, accessed date: 05.09.2021.

World Health Statistics (2020). Monitoring health for the SDGs, sustainable development goals

WWF (2018). Sustainable Food Systems and Diets, A Review of Multi-stakeholder Initiatives.

APPENDIXES

Appendix I- EXCEL File

Appendix II- EXCEL File

Appendix III- Main Actions of 3rd Agriculture Forestry Council By 2024

1. Establishing a Digital Value Chain from Field to Fork
2. Establishing and Implementing an Alternative Support Model with Contractual Production
3. Transition to a Region or Basin-Based Management Model in the Area of Agriculture and Forestry
4. Making legislative arrangements and put into practice for penalties to the deter of food fraudulence and adulteration
5. Preventing information pollution in food and increasing food literacy
6. Establishing the infrastructure to prevent food loss and waste
7. Encouraging the Consumption of Capri and Ovine Animals' Meat and Increasing its Market Share
8. Establishing 7 more heifer centers under the Breeding Heifer Production Center Project; consequently, increasing the total number to 32
9. Building mass feeding houses and establishing a mulberry garden within the scope of Silkworm Production Basin Project
10. Completion of Branding Infrastructure Works for Agriculture and Forestry Products
11. Efficient use of meteorological information in every stage of production in agriculture and forestry
12. Continuing to lease land to promote strategic production in foreign countries.
13. Increasing the Production of Fiber Plants to be Used for Industrial Purposes
14. Use of high technology and artificial intelligence applications in response to forest fires
15. Diversification of non-wood forest products, afforestation of forest areas to increase added value
and encouragement of agricultural forestry
16. Establishing the necessary legal regulations in terms of fire safety in licensing of dwellings and
workplaces in and around the forest
17. Enhancing Cooperation among Public, Private Sector and University for R&D and Innovation
18. Promoting international projects for the exchange of experience and know-how.

19. Evaluating all legislation on agriculture and forest with a holistic approach, establishing a simple

legislative structure

20. Rearrangement of neighborhoods as rural and urban in metropolitan municipalities, preserving

the village legal entity structure in rural neighborhoods

21. Enacting Water Law

22. Establishing and disseminating alternative models such as land banking and co-production in order to bring idle agricultural lands to production and solving the problem of transfer in agricultural lands by developing inheritance legislation

23. Using Soil and Water Resources within the Framework of Sustainable Management Principles

24. Supporting women and youth entrepreneurship to ensure the sustainability of family business

25. To conduct fight against desertification and erosion effectively and efficiently

26. Uncovering our nature tourism potential and becoming an international brand in nature tourism

27. Completing the identification and restraint studies of pastures, highlands and winter quarters

28. Supporting R&D projects for the re-use of wastes in order to reach the zero waste goal

29. Development of Licensed Warehousing, dissemination of electronic product trade

30. Increasing Buffalo Number and Productivity

31. Reaching international averages in calf mortality and fertility statistics

32. Increasing the share of sheep and ovine meat in red meat production by increasing the number of sheep and goats

33. Increasing alternative aquaculture species, production and productivity in aquaculture and hunting activities within the framework of sustainability principles

34. Development and Expansion of Domestic and National Seed and Seedling Sectors

35. Conservation, development and commercialization of local (Ata) seed varieties

36. Increasing production and marketing opportunities with Medicinal and Aromatic Plants
Action Plan

37. Thanks to promoting the production and use of organic and organomineral fertilizers, reducing the import of chemical fertilizers and environmental pollution, spreading the biological and biotechnical control methodologies

38. Conservation and Breeding of Our Pet Genetic Resources

39. Increasing studies on determination, protection, improvement and dissemination of domestic

genetic resources and biodiversity in the areas of agriculture and forestry, genetic resource database

project

40. Production of Veterinary Biological Products and Pharmaceutical Active Ingredients by encouraging technology and R&D investments

41. Completing the national forest inventory

42. Making our country an international forest sapling production and marketing center.

43. Eliminating the ownership problems experienced in the allocation and determination of the places to be moved beyond the forest boundary, by completing the registration of the forests whose cadastre has been finalized

44. Preparation of land use plans and agricultural land use plans, completion of detailed soil surveys

45. Completion of land consolidation projects by ten years

46. Prioritization of new irrigation investments and rehabilitation projects

Appendix IV- Water Council Declarations

1. Water Efficiency Strategy Document and Watershed Based Water Efficiency Action Plans will be prepared.
2. The water loss rate, which is 35 percent in drinking water systems, will be reduced below 25 percent by municipalities. In addition, in order to provide sustainable water services, studies on full cost-based water and wastewater pricing will be started as of 2023, and social and equitable water tariffs that take care of low-income household groups will be implemented with tiered tariffs aiming to use water sparingly.
3. The utilized water will be brought to suitable quality and reused, especially in agricultural irrigation, water footprint will be determined on the basis of sector and watershed, and water efficiency practices will be expanded in the industry within the scope of the European Green Deal.
4. Necessary legislative arrangements will be made until 2023 in order to strengthen the watershed-based and holistic structuring in water management and to increase the efficiency of the watershed-scale management plans.
5. In order to protect, improve and ensure sustainable management of our water resources, watershed-scale management plans for 25 watersheds will be completed and put into effect, and watershed management plans will be complied with in all water-related activities, including sub-scale planning.

6. A Water Law will be put into effect, which will eliminate the fragmented structure in water management, eliminate the gaps in the existing legal structure, and harmonize with the legislation on water quality in the European Union environment and climate change chapter.
7. Sustainable, effective, efficient and holistic use of water; strategies and policies related to monitoring the conservation of water resources will be included in all national plans such as the Development Plan and the National Water Plan.
8. Drinking water treatment plants will be designed and operated by taking into account the characteristics of the water and its suitability for the region.
9. It will be ensured that water safety plans from the source to the tap are prepared and implemented.
10. The wastewater treatment plants will be designed in accordance with the River Watershed Management Plans, taking into account the recovery potential and the intended use of the receiving environment where it is discharged.
11. In order to protect the quality of our water resources, the transition to receiving environment-based discharge standards will be ensured, and the measures in the river watershed management plans will be implemented to improve the quantity and quality of our waters.
12. As of 2022, the budget and infrastructure deficiencies required for the protection and monitoring of our underground and surface water resources in terms of quality and quantity will be eliminated, and inter-agency coordination will be made effective in a way to prevent duplications.
13. The National Water Information System will be disseminated and the use of decision support systems in all water-related studies will be expanded by ensuring the standardization in obtaining and sharing data.
14. Climate change adaptation activities, which gained importance with the approval of the Paris Agreement in the Turkish Grand National Assembly, will gain momentum by analyzing the effects of climate change on water resources.
15. By transitioning from crisis management to risk management in flood and drought management, Flood and Drought Management plans in all watersheds in our country will be completed by 2023 and the implementation of the measures determined in these plans will be followed continuously.
16. Forecasting and early warning systems will be established for flood and drought disasters, and necessary precautions will be taken before these disasters.
17. Resistance to climate change will be increased through training and awareness activities on desertification, erosion, water and soil protection within the scope of climate change with the inclusion of all segments of the society in the process, starting from 2022. The effects of climate change will be evaluated as a priority in all studies.
18. Irrigation of economically irrigable lands with modern irrigation methods will be expanded.
19. New financing models including the private sector will be developed in irrigation projects.
20. The crop pattern will be determined according to the water potential of the watershed and the agriculture approach will be based on water.

21. The targets of water saving will be achieved by providing remote control and automation of irrigation facilities with digital technologies. Measures to reduce energy costs in irrigation will be increased.
22. Due to the fact that our country is in an active seismic belt, necessary legal regulations will be developed for the safe operation of dams.
23. In order to increase the water storage capacity of our country, the construction of dams will continue, and necessary measures will be taken to extend the economic life of the existing dams.
24. Underground dams and groundwater artificial feeding structures will be planned and completed immediately.
25. Training/awareness-raising activities will be carried out in order to improve the water, meteorology and climate change literacy of all segments of the society starting from 2022.
26. The use of meteorological data in urban planning and agricultural activities will be increased in order to take precautionary measures against meteorological disasters due to climate change.
27. Nature-based solutions will be given priority, taking into account local knowledge and experience, in restoration applications in the upper watersheds.
28. It is ensured that R&D studies on water management will be supported and developed.