

NATIONAL ACTION PLAN FOR SUSTAINABLE SOIL MANAGEMENT IN TURKEY



Food and Agriculture
Organization of the
United Nations



REPUBLIC OF TURKEY
MINISTRY OF AGRICULTURE
AND FORESTRY

FOREWORD

The effects of climate change, desertification, land degradation and the loss of ecosystem services, which are increasingly felt today, exert pressure on agriculture and food security by causing social and economic challenges. Therefore, the sustainable use of natural resources is among the major environmental policies in Turkey, and intensive studies with national and international collaborators have been conducted on the topic in recent years.

In this context, a National Action Plan for Sustainable Soil Management (NAP) has been developed as a strategy and policy development document within the scope of a technical cooperation agreement between the Republic of Turkey's Ministry of Agriculture and Forestry and FAO's Turkey Country Office. The NAP development process was administered by the General Directorate of Agrarian Reform, ensuring close collaboration with national and international experts and all relevant stakeholders. Considering the global importance of agriculture and food security, the NAP aims to introduce and implement the principles and practices for sustainable soil management at the national scale within the framework of the "Revised World Soil Charter" by raising awareness.

The objective of the NAP, which addresses threats to healthy soils, is to build a joint legal framework for sustaining soil health and its ecosystem services on which our economic activities and well-beings firmly depend for future generations.

This national action plan has been developed to ensure current and future sustainable use of soils in Turkey together with all national stakeholders engaged in planning, management and monitoring of soils. In particular, experts on the subject from different units of the Ministry (GDAR, GDARP, SHW, GDF and GDDE), Universities and NGOs made invaluable contributions in defining and formulating actions and activities included in the NAP.

The NAP aims to provide the most efficient and appropriate use of soil resources in Turkey by strengthening the basis of soil management and related information systems within the scope of agricultural infrastructure services. At the same time, the NAP seeks to contribute to Turkey's policies under international agreements such as the Global Soil Partnership, United Nations (UN) Convention to Combat Desertification, UN Framework Convention on Climate Change, Convention on Biological Diversity, and the Sustainable Development Goals.

In line with a needs analysis conducted during the NAP process, the establishment of the Turkish Soil Information System (TSIS) was seen as the main building block in achieving and monitoring the NAP goals. The establishment of a fully functioning TSIS capable of meeting the current soil data requirements that are essential for increasing productivity in agriculture, healthy food production and natural resource management, has been prioritized. The TSIS should focus on food support services, providing information from producers to consumers, fulfilling the needs of all stakeholders that use soils, and meet environmental, economic and social needs. With the TSIS, it is aimed to initiate a new mechanism to increase the relevant individual and institutional capacities along with formulating and implementing a soil information technology policy according to international standards with a clear operating structure in terms of soil data and information management.

The NAP is foreseen as a document showing the activities and a road map for developing effective strategies, policies and practices to support sustainable soil management, which can be achieved in a 5-year period for decision makers, researchers, academics, NGOs and other soil stakeholders, and has been presented to the relevant users attention.

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LIST OF ABBREVIATIONS

CATAK	Environmentally Based Agricultural Land Protection Project
DG	General Directorate
DGAR	General Directorate of Agricultural Reform
DGARP	General Directorate of Agricultural Research and Policy
DGCDE	General Directorate of Combating Desertification and Erosion
DGF	General Directorate of Forestry
DGPP	General Directorate of Plant Production
ESP	European Soil Partnership
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GLOSIS	Global Soil Information System
GLOSOLAN	Global Soil Laboratory Network
GSP	Global Soil Partnership
IPARD	Pre-accession assistance for rural development
ITPS	Intergovernmental Technical Panel on Soils
LDN	Land degradation neutrality
MAF	Ministry of Agriculture and Forestry
MEU	Ministry of Environment and Urbanization
NGO	Non-governmental organization
NSLN	National Soil Laboratory Network
SSM	Sustainable soil management
SDG	Sustainable Development Goal
SHW	State Hydraulic Works
TSIS	Turkish Soil Information System

1. BACKGROUND

Soil is increasingly recognized as an essential natural resource for the production of nutritious food in sufficient quantities, and for its role in supporting environmental processes such as climate change mitigation, adaptation to adverse climatic conditions, water cycling and purification, and more.

At the same time, soil provides material for building and a platform for settlements and roads. There is growing awareness that soil resources are limited and require careful management to ensure its continued functioning to provide essential ecosystem services and preserve biodiversity. Due to its limited extent and ranging properties, soils suitable for agricultural production are under pressure from increases in population, higher demands for food and competing land uses.



The Global Soil Partnership (GSP) was established in 2012 under the Food and Agriculture Organization (FAO) of the United Nations as a mechanism to improve soil governance and promote sustainable soil management to ensure the provision of soil ecosystem services. To achieve this, the GSP addresses the following five pillars of action to be implemented in collaboration with its regional soil partnerships:

- Pillar 1: Promote sustainable management of soil resources for soil protection, conservation and sustainable productivity
- Pillar 2: Encourage investment, technical cooperation, policy, education, awareness and extension in soil
- Pillar 3: Promote targeted soil research and development focusing on identified gaps, priorities and synergies with related productive, environmental and social development actions

- Pillar 4: Enhance the quantity and quality of soil data and information: data collection (generation), analysis, validation, reporting, monitoring and integration with other disciplines
- Pillar 5: Harmonization of methods, measurements and indicator for the sustainable management and protection of soil resources

Turkey is part of the regional European Soil Partnership and the Sub-regional Eurasian Soil Partnership. The General Directorate of Agricultural Reform (DGAR) under the Ministry of Agriculture and Forestry (MAF) and the European Union Directorate General for Foreign Relations coordinate the operations as National Focal Point of the GSP.

Since its inception, the GSP has developed numerous global reports, tools and guidelines to guide and support the governance and implementation of sustainable soil management (SSM) at regional and national levels. In the Revised World Soil Charter, soil management is defined as sustainable if “the supporting, provisioning, regulating, and cultural services provided by soil are maintained or enhanced without significantly impairing either the soil functions that enable those services or biodiversity”. The Intergovernmental Technical Panel on Soils (ITPS) compiled a comprehensive report on the Status of the World’s Soil Resources in terms of the specific threats to soil’s continued contribution to ecosystem services. The ten soil threats considered were soil erosion, soil organic carbon loss, nutrient imbalance, soil acidification, soil contamination, waterlogging, soil compaction, soil sealing, salinization, and loss of soil biodiversity. The report concluded that the majority of the world’s soil resources are in only fair, poor or very poor condition and in need of sustainable soil management. The Voluntary Guidelines for Sustainable Soil Management were developed as a reference providing general technical and policy recommendations for a wide range of committed stakeholders to address the ten soil threats. As a voluntary partnership, the GSP encourages national partners to translate its global guidelines into concrete actions and practices at national level to support farmers and land users with SSM.



The ITPS further developed guidelines for the assessment of SSM to support countries in the evaluation of the characteristics of a sustainably managed soil in relation to the threats to healthy soils. The guidelines outline six key steps to assess the sustainability of current soil management and provide an ideal methodology to support the development of national soil management and monitoring plans. The six key steps assess the important site features, potential

natural and off-site threats, current management practices, selection of indicators to determine if current management practices are sustainable, collection and interpretation of indicator data, and implementation of improved management (where needed), along with the establishment of longer term monitoring to assess effectiveness of any changes in soil management. In addition, the guidelines present examples of indicators to be used to assess and monitor SSM. Since many changes in soil are gradual, undertaking a monitoring program using indicators to assess changes over time, will assist in determining if soil conditions are improving, declining, or remaining stable.

Since evidence-based decisions are central to the achievement of SSM, such decisions should be based on sufficient quantity and high-quality soil data and information. Furthermore, soil information should be harmonized and globally consistent to have impact. The Global Soil Laboratory Network (GLOSOLAN) was established to facilitate networking and capacity development through cooperation and information sharing between soil laboratories based on a set of agreed harmonization principles. In turn, the Global Soil Information System (GLOSIS) is being established based on a country-driven approach to enhance the quantity and quality of soil data information. This is based on the premise that the improvement of soil information at the global level is dependent on the improvement of information at the local level. Therefore, GLOSIS will use primarily use soil data from Country Soil Information Systems through a collaborative network using a distributed design.

This national action plan was developed through a collaborative process managed by the Turkish Ministry of Agriculture and Forestry and technically supported by the FAO country office in Turkey. The process included a wide range of national stakeholders involved in soil planning, management and monitoring to develop a strategy to guide the future sustainable management of soil in Turkey

2. NATIONAL CONTEXT

The national context and challenges related to soil legislation, planning, management, and monitoring was assessed through a series of workshops, consultations and interactive feedback sessions involving a broad range of public and private sector stakeholders working in soil-related areas.

An online e-consultation process was launched to assess current soil-related activities in relation to national, regional and global priorities, initiatives and legislation; threats to soil health; and soil data and information.

A technical workshop was held with a broad range of stakeholders to determine the current challenges and priorities in relation to five main themes of importance identified by stakeholders as:

- Soil policy and legislation
- Strengthening institutional structure
- Sustainable soil management
- Soil information system
- Soil research

2.1. Soil related policies, planning, monitoring and research

The mandate and responsibility for soil use planning, implementation and monitoring activities in Turkey fall under different governmental bodies and relate to different global, regional and national policies. The Ministry of Agriculture and Forestry (MAF) has the mandate for the management of soil and water resources under agriculture, forestry and grazing lands which accounts for about 70% of Turkey's total land area. Under this mandate, the MAF is responsible for governing the sustainable use of soil as an essential resource for agriculture, food security and climate change adaptation and mitigation. These activities are performed at different levels under the MAF and by different General Directorates (DGs). Similarly, the Ministry of Environment and Urbanization (MEU) is responsible for various soil-related aspects under different DGs. The primary laws and regulations pertaining to soil protection and management in Turkey are listed in Table 1.

From a global perspective, the Sustainable Development Goals (SDGs) considered most relevant to soil conservation and management activities implemented in Turkey are SDG 2 (Zero Hunger), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), SDG 1 (No poverty), and SDG 15 (Life on Land). Of the three Rio Conventions, the United National Convention to Combat Desertification is considered the most relevant to soil-related activities, followed closely by the United Nations Convention on Climate Change and to a lesser extent, the United Nations Convention on Biological Diversity.

Activities related to soil conservation, management, research and monitoring is implemented by various non-governmental entities in Turkey, including various universities, non-governmental organizations (NGOs), international organizations and others. The majority of these activities are implemented in partnership between different organizations and address all ten of the threats to healthy soils identified under the GSP, with the largest proportion addressing soil erosion, soil salinization and alkalization, and soil organic carbon loss.

Soil-related activities do not always relate to specific national or international programs, which means that these may be implemented to varying extents in isolation. When activities relate to existing programs, this is mostly connected

to funding sources, with the majority of activities supported by international funds from the European Union (EU), including its pre-accession assistance for rural development (IPARD). At national level, activities relate mostly to the Rural Development Subsidies and Agro-environmental Subsidies combined, followed by the Environmentally Based Agricultural Land Protection Project (CATAK).

The implementation of subsidies is an important pathway supporting land and soil related activities, although the soil-related criteria or indicators in these subsidy systems are considered insufficient as they mostly include land suitability classes, soil groups, soil depth and slope. Support to farmers and land users for different soil management practices by organizations is the exception rather than the rule and is mostly provided in activities related to IPARD, CATAK and the Agro-environmental Subsidies. Nonetheless, the majority of soil conservation and management activities are implemented at the local, provincial and district level, followed by national and regional levels. Soil data is only produced in roughly half of these instances.

Table 1. Basic legislation concerning soil management and conservation in Turkey.

<i>Name of the Law / Regulation</i>	<i>Law No / RG No</i>	<i>Issue Date</i>	<i>Objective</i>	<i>Scope</i>
Soil Conservation and Land Use	5403	19.07.2005	To determine the methods and principles that will ensure the conservation and development of soil by preventing the loss of its properties by natural or artificial means and the planned land use in accordance with the principle of sustainable development of the environment.	It covers the determination and classification of land and soil resources in accordance with scientific principles, preparation of land use plans, evaluation of social, economic and environmental aspects of the conservation and development process with participatory methods, prevention of unintended and misuse, creation of methods to provide protection.
The Agricultural Reform for Land Arrangement in Irrigation Areas	3083	01.12.1984	Irrigation areas; to ensure the efficient operation, protection of the soil, to obtain the maximum economic efficiency from the unit area, to increase the agricultural production continuously, to evaluate and to increase the employment opportunities there.	Determination of application areas, land consolidation and in-field development services, land distribution, regulation of savings in the distributed land, land registry and cadastral operations, such as the support of the issues are determined under this law.
Agricultural land Protection and Land Use Regulations	27298	25.03.2005	To determine the methods and principles regarding the use of agricultural lands by using an approach that is essential for the conservation of the soil, determining and protecting the plains with high agricultural production capacity and making land consolidation and distribution.	For the protection of agricultural lands; Examination of requests for non-agricultural land Permission if deemed appropriate, identification and protection of large plains, village development, rural regulation covers land consolidation issues.
Protection of Cultural and Natural Assets	2863	23.07.1983	To organize the definitions, transactions and activities related to movable and immovable cultural and natural assets that need to be protected and to determine the establishment and duties of the organization that will take the necessary principles and implementation decisions in this regard.	Covers the rules and principles to protect cultural and natural assets and the duties and responsibilities of real and legal persons.
Forest Law	6831	08.09.1956	To ensure the protection of all forest land covered by this law.	The definition, distribution, management and control of forests and forest lands.

Regulation on Control of Soil Pollution Law	27605	08.06.2010	To set out the principles of taking required measures in harmony with the sustainable development targets, for the prevention of the soil pollution as receptor media.	The technical, administrative principles and legal sanctions regarding the use of treatment sludge and compost arising because of the activities causing soil pollution, discharge, disposal and leakage of the dangerous substances to the soil and purification of the household waste and industrial waste having household waste qualities.
Pasture Law	4342	25.02.1998	To ensure the determination, limitation and allocation of pastures and meadows on behalf of village or municipal legal entities, to use them in accordance with the rules to be determined, to increase and maintain their efficiency by performing maintenance and breeding, to monitor their usage continuously and to change the purpose of use.	This law covers rangelands, highlands and barracks, and common meadows and pastures.

2.2. Soil data and information

A prerequisite for the sustainable management of soil is reliable information on soil resources and in particular how different soils react to various forms of land use and management. In Turkey the effect of land use and management on soil properties has been studied for a long time, but the establishment of soil information systems based on the needs and responsibilities of different government agencies was only initiated during the last 10 years. Different soil information systems have been developed under different institutions, with each system operating separately, using a wide range of technical standards and often targeting specific scales. In addition, each institution aims to store, use and manage its own soil data and information. As a result, these information systems do not operate according to an overall national standard and soil data and information is not harmonized across information systems. This hampers evidence-based support to policy development and implementation from a wider soil perspective and prevents information systems from being fully compatible with international information systems or laboratory networks such as GLOSI and GLOSOLAN under the GSP.

An analysis of existing soil information systems highlighted three independent systems operated separately under different state institutions (DGAR, DGARP, DGCDE). These systems focus on their own objectives and tasks based on the mandates of the institutions, rather than on monitoring the 10 soil threats identified under the GSP and supporting SSM at national level. Information provided by a Turkish Soil Information System (TSIS) should be able to assess the risks arising from existing soil threats and ideally anticipate unreported threats in the country towards SSM planning and implementation. Thus, the following recommendations for the development of a TSIS are grouped under five main headings:

I. Systematically reviewing and evaluating available data;

The different institutions host numerous soil data sets which need to be reviewed for the TSIS. To achieve this, each institution should review and inventory its existing soil data and describe the current data structure. In addition, systematic surveys should be conducted to determine the status of soil data and information produced and used by different stakeholders.

II. Development of National Soil Data Policy

A national soil data policy would facilitate discussions regarding the establishment of a TSIS and data sharing within this system. It is therefore essential to: a) Accelerate the development of a soil data sharing policy and enhance the level of

soil information management, b) Systematically establish a standard soil data sharing system, and c) Clearly define the roles and responsibilities of data providers.

III. Establishing the TSIS based on country needs and compatible with GLOSI.

Specific soil data and information required for SSM decision making in Turkey should be determined and prioritized for inclusion in the soil information system. Existing data should be determined and prioritized based on the 10 soil threat priorities, rather than working on 50 or more soil properties. After identifying and understanding which data are prioritized, a systematically harmonized geo-referenced soil meta database should be designed and established with a review of legacy data, in particular profile data, land ownership data, and other relevant data. Soil profile (pedon / polypedon = profile) data, which forms the basis of soil classification, should be prioritized and determined by the institutions producing soil data, along with soil scientists, to form a common opinion on the implementation of this national standard. As a result, it is a high priority that an internationally defined soil classification system to be selected and used by all institutions. This would enable the establishment of the TSIS according to the selected soil classification system. It is also important to establish a national standard for soil characterization and analysis. The MAF should encourage and motivate universities, private sector stakeholders and even individual farmers to contribute as "soil citizens" and benefit from this soil information system. In the meantime, data collection and updating will be much faster and cost efficient.

IV. Soil data quality assurance and control

It is essential to improve the accuracy, quantity and quality of soil data and information during the processes of data collection (production), analysis, verification, reporting, monitoring and integration with other disciplines. Thus, a) Quality control for soil data (including both legacy data and the data to be produced) is required. For this purpose, the determination of control principles and ring tests should be undertaken. b) The National Soil Laboratory Network (NSLN) should be strengthened and maintained. DGARP, the NSLN leader/ coordinator, shows that since the reference laboratory is part of GLOSOLAN, it should take a leading role in establishing networks with other laboratories in the country in establishing cooperation and developing control mechanisms. Therefore, this proposed network should be compatible with GLOSOLAN.

V. Establishment and development of a Turkish Soil Information System (TSIS) and production of national soil maps

Collection of soil samples by different institutions and production of different maps from this data results in a complex and fragmented structure. For example, three different Soil Organic Carbon Maps have been developed at a national scale for three different reporting purposes. To overcome these challenges, the following is suggested: a) The government should assign the role of managing the TSIS to a single institution, b) Relevant capacities should be developed for institutions and individuals to support the establishment and implementation of the TSIS, and c) Since the establishment of this system and the production of national soil maps will take some time, the necessary budget should be provided.

2.3. National development targets related to SSM and TSIS

Turkey has been a member of GSP since 2012. The Ministry of Food, Agriculture and Livestock carried out the national focal point between 2013 and July 2018 and this task is still fulfilled by the MAF.

In cooperation with the DGARP, DGAR and the General Directorate of Foreign Affairs of the European Union, participation and contribution is provided for the Partnership.

Within the GSP organization, Turkey is a part of the European Soil Partnership (ESP) and Eurasian Soil Partnership. In addition, the position of Vice-Chairman of the ESP Executive Committee is jointly carried out by Turkey and Italy. Turkey was represented in the ITPS by an expert in the European group between 2015-2018.

- Since the beginning of the process, Turkey has actively participated in the development, conservation and sustainable use of soil resources. Studies are closely monitored by the relevant institutions. The Eurasian Soil Partnership Workshop was held in İzmir on 16-18 June 2015 in cooperation with Agricultural DGARP in cooperation with FAO / ICARDA. (<http://www.fao.org/global-soil-partnership/resources/events/detail/en/c/275547/>).
- In 2018, the Company participated in the development of the Global Soil Organic Carbon Map, which was completed by GSP, with the cooperation of DGARP-FAO and the National Soil Carbon Map.
- Within the scope of GSP soil carbon mapping capacity development activities, a training was organized in our country. (<http://www.fao.org/global-soil-partnership/resources/events/detail/en/c/1045143/>).
- GSP Plenary Assembly meetings, International Network of Soil Information Institutions workshops and GLOSOLAN meetings are participated by the related institutions. Developments are followed. There are ongoing efforts to harmonize these with national activities.

Existing national action plans, targets, objectives and actions relevant to soil management in Turkey are listed in Table 2.

Table 2. National Action Plans and soil relevant targets, objectives and actions.

<i>Document</i>	<i>Period</i>	<i>Targets / Objectives / Actions related to soil</i>
11th Development Plan of Turkey	2019-2023	<p>Target 405.1. Detailed soil surveys showing soil capabilities throughout the country will be made, mapped and classified.</p> <p>Target 405.2. Preparation of agricultural land use plans based on soil information system will be completed.</p>
Medium Term Program	2018-2020	<p>Target 405.1. Detailed soil surveys showing soil capabilities throughout the country will be made, mapped and classified.</p>
National Strategy and Action Plan to Combat Desertification	2015-2023	<p>Action 1.2.2. Implementation of awareness raising studies about sustainable use of forests, agricultural lands and pastures as well as preserving soil and water resources to target women as well.</p> <p>Action 4.4.1. Extend R&D practices on product pattern in conformity with soil type, land capability and the amount of water in agricultural lands, controlled irrigation and, using right inputs.</p> <p>Action 7.1.2. Define and classify all qualities and abilities of agricultural land; build infrastructure i.e. database; prepare soil and interpretation maps.</p> <p>Action 7.3. Special approaches for affected zones are developed to decrease soil loss and erosion sensitivity of land (Suitable cultivation and rehabilitation, irrigation, fight with soil and water contamination, organic farming and good farming practices, afforestation, rehabilitation of spoiled forest techniques, methods and soil preservation strategies), respective adjustments are made and implemented in plans and projects accordingly.</p> <p>Action 7.3.5. Complete product patterns in conformity with natural assets and environment as well as soil type and land ability based on agricultural land in all provinces; revise product pattern maps in line with water constraint; encourage product pattern changes.</p>
Republic of Turkey Climate Change Action Plan	2011-2023	<p>OBJECTIVE T1.1. Determine and increase the quantity of carbon stock captured in the soil</p> <p>Action T 1.1.1.1. Determining the carbon stock captured in the soil through sampling method</p> <p>Action T 1.1.2. Increasing the effectiveness of soil management</p>

		<p>Action T 1.1.2.1. Preparing and presenting to users up to-date soil maps at international standards</p> <p>Action T 1.1.2.2. Preparing and publishing Turkey's erosion risk map</p> <p>Action T 1.1.2.4. Monitoring soil pollution and land deteriorations</p> <p>OBJECTIVE T1.2. Identifying and increasing topsoil and subsoil biomass</p> <p>Action T 1.2.1.1. Mapping planted agricultural lands in accordance with the ages and types of planted trees, thereby determining the subsoil and topsoil biomass</p> <p>Action T 2.1.1.1. Identifying the emission sources and sink capacities in the agriculture sector</p> <p>OBJECTIVE T2.1. Identify the potential GHG emissions limitation in agriculture sector</p> <p>Action T 2.2.1.2 Strengthening the infrastructure of Soil and Fertilizer Analysis Labs</p> <p>OBJECTIVE T3.1. Build the information infrastructure that will meet the needs of the agriculture sector in adapting to and combating climate change</p> <p>Action T 3.1.1.3. Identifying and monitoring the carbon content in soil</p> <p>OBJECTIVE UT4.1. Protecting the physical, chemical and biological efficiency of soil against climate change impacts</p> <p>Action UT4.1.1. Developing classification standards for protection, improvement and efficient use of soil and lands, monitoring such practices and ensuring land use in consideration of capability classes</p> <p>OBJECTIVE UT2.1. Developing and expanding R&D activities for effective crop, soil and water management</p> <p>Action UT2.1.1. Conducting analysis on the impacts of climate change on the agriculture sector</p> <p>OBJECTIVE UT2.3. Developing a 'Soil and Land Database and Land Information System' taking into consideration the effects of climate change</p> <p>Action UT2.3.1. Addressing climate change impacts in existing Soil and Land Database and Land Information System studies</p>
Nationally Determined Contribution		<ul style="list-style-type: none"> • Rehabilitation of grazing lands • Controlling the use of fertilizers and implementing modern agricultural practices • Increasing sink areas and preventing land degradation
National Action Plan for Biodiversity	2018-2028	Action 4.2. In order to increase benefits from ecosystem services, studies to reduce the pressures such as pollutions (air, water and soil), habitat loss and degradation, global warming will be conducted.

2.4. Gaps and needs for national SSM and TSIS to reach the national development targets

The MAF monitors the management of agricultural and forest ecosystems under the threat of climate change and soil degradation, as well as national and regional programs and contracts, and monitors the national and regional programs and conventions. The MAF is directly responsible for the realization of the organization. Therefore, MAF is officially responsible for being the first point of contact and solution center of all issues related to agriculture and forest ecosystem services. MAF is one of the main organizations that have responsibilities such as surveying, identifying, mapping, creating databases and establishing and serving multidisciplinary users and practitioners in information systems, especially in the soil.

In order to ensure food safety, the scope of the activities required for the continuation of soil ecosystem services and sustainable natural resource management is not limited to the duties and powers of the MAF. In a broader and more effective cooperation with all relevant institutions, with a direct and indirect approach, capacities must be combined, strengthened, sustained, and maintained in an appropriate / common system as an indivisible whole.

It is necessary to establish comprehensive administrative and technical cooperation with different Institutions / Organizations and Universities on MAF's planning and management of soil information technologies on the country basis. As a result, it is evident that a TSIS strategy and "action plan", together with global and international standards, have to establish and implement a comprehensive soil information technology policy. At national and international scales, DGAR, DGARP, DGCDE, DG-Forestry and State Hydraulic Works (SHW) are responsible for producing and using soil data and information for various study-mapping, planning and research purposes, respectively. Among these units, there is no obvious operation structure in terms of soil data and information management. With the help of a required management approach and operation, a new process should be started with TSIS system and related capacities should be established.

Results of a gap analysis with regards to soil information in Turkey is presented in Table 3.

Table 3. GAP analysis with regards to current soil information in Turkey.

Current Status/ Legal Infrastructure, Current Activities, Programs and Practices
<ul style="list-style-type: none"> - Various soil data are produced and used at various levels in the General Directorates. - There is no soil information system covering all the soil data in the Agricultural Information System. - The distribution of different information systems that use and produce soil data is as follows. <p>In DG-Agricultural Reform (DGAR)</p> <ul style="list-style-type: none"> - Agricultural Land Assessment Information System (<i>TAD Portal</i>) - Soil Survey and Mapping Information System (<i>TEH Portal</i>) - Nitrate Information System (<i>NIBIS</i>) - Soil Plant and Irrigation Water Laboratory Information System (<i>TADLAB</i>) - Agricultural Land Management (<i>TAY</i>) Portal - Geographical Information Systems Operations Module, - Agricultural Parcels GIS Operations Module (<i>GIS</i>) - Farmer Registration System (<i>EQS</i>) Operations Module In DG-Agricultural Resource and Policy (DGARP) <p>In DG of Agricultural Research and Policies</p> <ul style="list-style-type: none"> - National Soil Information System <p>In DG-Plant Production (DGPP)</p> <ul style="list-style-type: none"> - Organic Agriculture Information System <p>In DG-Combat Desertification and Erosion (DGCDE)</p> <ul style="list-style-type: none"> - Soil Information System - From these databases; only the soil survey and mapping portal (<i>TEH portal</i>) data comes from the field. Processed and organized data can be used in different units or made available to farmers. - In the upcoming period, information systems related to these databases should be examined and elaborated.

Strengths

- A sufficient awareness has been achieved in the Ministry units with regards to the importance of Soil Information Systems in monitoring the impact of policies' implementation.

Weaknesses

- There is a lack of coordination between the Soil Information Systems established by different units; it includes soil data on different scales.

- There is no dynamic data flow provided from the site in the systems established under the name of Soil Information System. Instead, current data are analyzed.

Recommendations

- The accuracy of the data presented by the completed and ongoing projects should be reviewed.
- Integration of soil data generated by different units should be ensured.
- It is necessary to determine the duties of the institutions on soil data and their cooperation with other units.
- The possibility of establishing a TSIS in which all data and information systems will be integrated should be investigated by gathering all relevant institutions, research units and non-governmental organizations on the soil data.

3. STRATEGIC FRAMEWORK

3.1. Vision

Our vision is for soils in Turkey to be protected and management in a sustainable manner and monitored through the fully functioning TSIS to ensure soils' continued ability to perform essential functions (e.g. supporting healthy food production and forestry, supporting biodiversity) in alignment with the Global Soil Partnership and sustainable development, based on sound evidence.

3.2. Goal

Based on the assessment of current soil governance, planning, implementation actions and monitoring, the goal for this action plan is as follows:

Goal: The overall goal of this action plan is to present priorities and actions to improve national coordination, implementation and monitoring of Turkey's soil resources, supported by the TSIS and targeted soil research and development to ensure the sustainable management of soils.

3.3. Strategic objectives

To achieve the vision and goal, the strategic objectives are as follows:

Objective 1: To improve current legislation to ensure the conservation and sustainable management of soil.

Objective 2: To improve the coordination of soil policy development and implementation.

Objective 3: To ensure required capacity to support the conservation and sustainable management of soils in Turkey.

Objective 4: To improve soil management under different land uses.

Objective 5: To integrate dispersed soil data and information for evidence-based decision making.

Objective 6: To align national soil research and development priorities with those of the GSP.

3.4. Strategic targets

The targets (Figure 1) to achieve the strategic objectives over a five-year period are:

Target 1: Strengthen soil polices and legislation to ensure they include regulations for the sustainable management of soil. (1-5 years)

Target 2: Establish a national institutional structure and mechanism to oversee all actions and activities related to soil policy development and implementation. (2 years)

Target 3: Continuously develop institutional and individual capacity and raise awareness to support the sustainable management of soils. (Continuous)

Target 4: Establish a national SSM framework to develop and implement soil conservation, management and monitoring plans. (1-5 years)

Target 5: Establish and develop the centralized TSIS in line with GLOSIS for evidence-based decision making and monitoring. (2 years)

Target 6: Determine and include soil research and development priorities into the national Research Master Plans. (1-5 years)

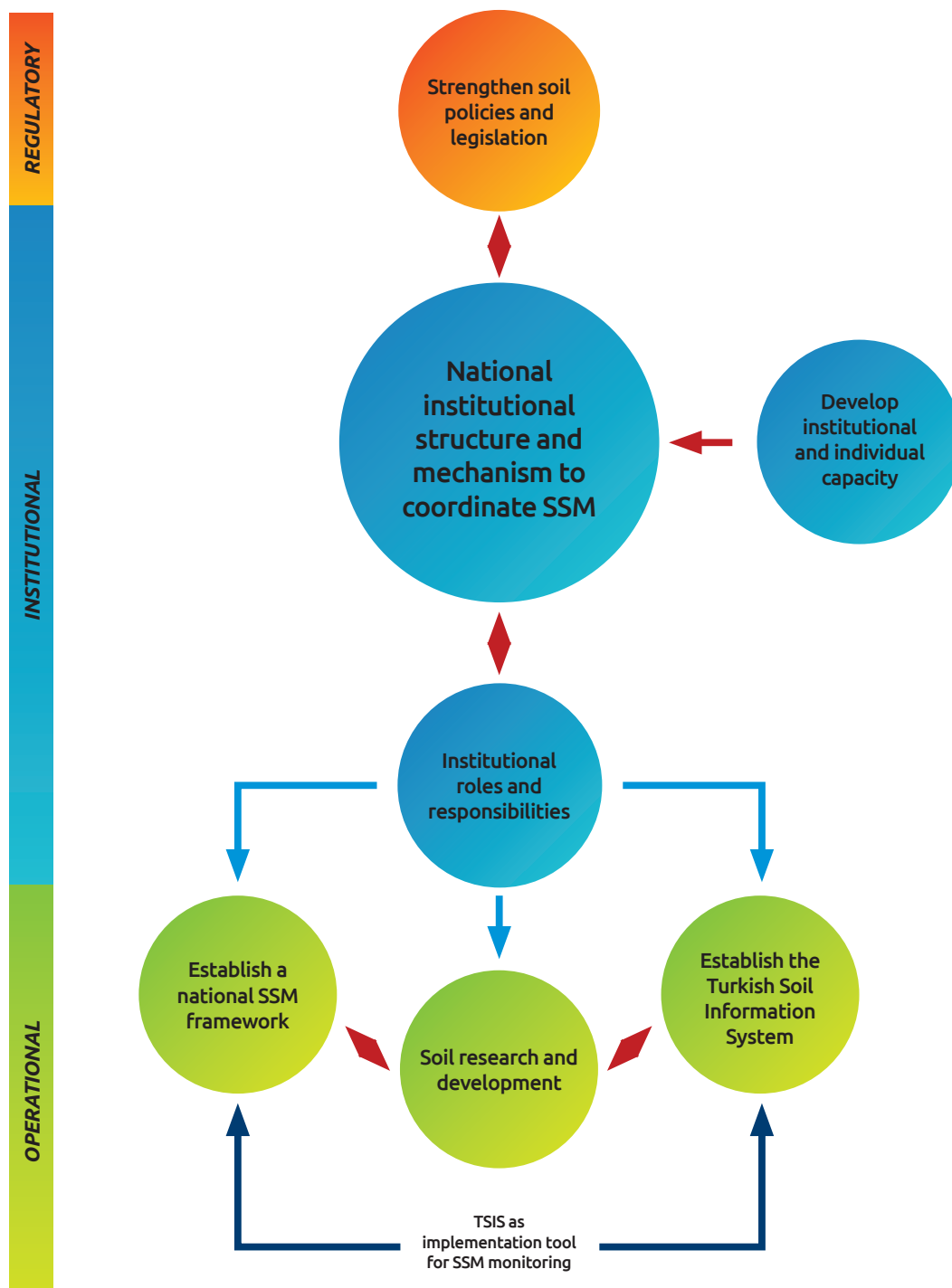


Figure 1. Schematic representation of the regulatory, institutional and operational targets for sustainable soil management in Turkey

TARGET 1 (T1): STRENGTHEN SOIL POLICIES AND LEGISLATION

The existing soil use legislation and regulations related to the implementation of soil management policies should be re-addressed in order to ensure that they include actual and updated regulations and arrangements observing the sustainable use of soil ecosystem services under the priority of food security.

Harmonizing soil management policies by specifying legislation on soils and determining priorities from those to address soil issues (soil conservation or avoidance of soil degradation).

The following actions proposed to solve these problems should be performed within the first 2-year period.

Action T1.1. Review currently enforced legislation for land and soil management to identify and eliminate conflicts.

Activity T1.1.1. Merging Laws 5403 and 3083 in order to incorporate 3083 into 5403.

Activity T1.1.2. Defining "rural areas" to ensure the sustainable use of agricultural soils within these areas.

Activity T1.1.3. Amending Law 5403 to ensure the protection of agricultural areas declared as "Great Plains" from non-agricultural land use.

Action T1.2. Improving legislation to address the main soil threats that hinder SSM

Activity T1.2.1. Revising legal criteria to protect agricultural soils from non-agricultural land use demands and specifying the necessary restrictions.

Activity T1.2.2. Revisiting and amending the Law 5403 in terms of the functions, mandates and structure of soil protection committees related to the sustainable use of soil resources.

Activity 1.2.3. Making provision for the allocation of non-agricultural land use to highly degraded lands.

Activity T1.2.4. Strengthening the regulations for restoration projects where extensive soil degradation has occurred as a result of, for example, construction, infrastructure development and mining.

Activity 1.2.5. Strengthening legislation to restrict the disposal of organic and inorganic wastes (waste sludge, steel slag, biogas fermented waste, etc.) on soil.

Activity 1.2.6. Improving Articles 9, 15, 16, 20 and 21 under the "Soil Conservation" section of Law No. 5403 by incorporating relevant SSM indicators

Action T1.3. Developing a financial and environmental offset mechanism for agricultural areas to counterbalance losses of soil ecosystem services resulting from land take and soil sealing.

Activity T1.3.1. Improve legislation related to land take and soil sealing to make provision for offset mechanisms by analyzing and addressing current gaps.

Activity T1.3.2. Assessing the economic value of soil ecosystem services lost as a result of land take and soil sealing for financial offset purposes.

Activity T1.3.3. Making the necessary legislative arrangements for the use of soil stockpiled during construction and mining in the rehabilitation of degraded agricultural areas.

Action T1.4. Defining a national implementation strategy to improve soil management through subsidies and incentives.

Activity T1.4.1. Revision of agricultural subsidies to incorporate SSM indicators.

Activity T1.4.2. Integrating SSM subsidies and incentives into general and agricultural land use planning in watersheds and great plains.

TARGET 2 (T2): NATIONAL INSTITUTIONAL STRUCTURE AND MECHANISM

An analysis of the current Turkish institutional structure responsible for the main soil-related policies and their associated mandates revealed that there is a lack of a specialized managerial unit focusing on soil threats and problems.

On the other hand, many departments under different headquarters implement direct and indirect investment projects related to the conservation and sustainable use of soil resources. In order to ensure that these projects are comprehensively planned and carried out successfully, there is a need for an independent administrative structure or unit that focuses on SSM indicators and practices or identifies soil problems to the extent that those could be addressed appropriately. Otherwise, soil problems and issues are usually likely to be ignored, and they are not given the required emphasis in multi-purpose soil management systems and legislative amendments and regulations. It is essential to provide the required budgetary resources to ensure the economic sustainability of this incentivized coordinating institution.

The role of such a structure or mechanism would be:

- Designing an integrated and innovative information management process to ensure information exchange among institutions and within a data sharing network.
- Ensuring cooperation and coordination between institutions and State institutions in terms of the sustainable use of soil resources.
- Promoting soil surveys for SSM indicators in line with the SDGs, identifying the barriers and opportunities and determination of insufficient individual and institutional capacities.
- Raising awareness that SSM is an important form of soil management.
- Establishing a Monitoring, Evaluation and Reporting Mechanism of Soil Policies and Legislation Practices, as well as soil related research and development towards the sustainable management of soils in Turkey.
- Managing the TSIS as primary tool to plan and monitor SSM activities by securing the official contributions of other stakeholders and determining the role and responsibilities of all other actors around the unifying role of the central coordinating organization.
- To seek opportunities for association and cooperation with international specialists and institutions to work on soil issues.

In order to establish such a national structure or mechanism, the following actions are to be implemented as initial steps:

Action T2.2: Establishing or assigning a national coordinating institution and forming supporting bodies for the conservation and sustainable use of soil resources.

Activity T2.2.1 Specifying the roles and responsibilities of the national coordinating institution.

Activity T2.2.2 Establishing a high-level soil advisory board under the national coordinating institution to support soil policy development and implementation.

Activity T2.2.3 Establishing a National Soil Partnership as a network to facilitate national activities related to the GSP.



TARGET 3 (T3): INSTITUTIONAL AND INDIVIDUAL CAPACITY

Improved institutional and individual capacity is essential to support and ensure the implementation of all elements of this action plan and improve the coordination of SSM related activities.

Establishing and developing institutional capacities is necessary to ensure the organizational coordination of SSM indicators through a collaborative and efficient TSIS. It would be appropriate to appoint an institute within the MAF to organize relevant training programs on an annual basis for decision makers, planners and executives within MAF, as well as in other Ministries in order to keep them updated about the GSP programs and SSM issues.

The following short-term actions are to be implemented:

Action T3.1: Developing an agenda to ensure continuous SSM capacity development and awareness raising activities for institutions and individuals.

Activity T3.1.1. Organize awareness raising events to celebrate relevant national and international days such as World Soil Day (5 December), World Day to Combat Desertification (17 June), National Soil Fest Week using widespread media and press releases.

Activity T3.1.2. Collaborate with the GSP to develop capacity in all aspects of soil policy, sustainable soil management and land use planning, the TSIS, and soil research and development.

TARGET 4 (T4): NATIONAL SUSTAINABLE SOIL MANAGEMENT FRAMEWORK

The existing implementation of activities related to soil conservation and management in Turkey are fragmented and there is no national framework or strategy to guide the implementation and monitoring of such activities.

There are also numerous land use and management systems and associated terminology in use that contribute in some form to soil management. These include sustainable land management, good agricultural practices, climate-smart agriculture, soil and water conservation measures and methods, land degradation neutrality (LDN), and conservation agriculture. Links between these systems and SSM indicators need to be clearly identified, and SSM-based land use programs launched accordingly. The development of a national SSM framework would enable targeted and coordinated consideration of soil threats in the planning and implementation of land use and management at national regional and local levels, particularly in rural areas. Under such a framework, cooperation and coordination between institutions and relevant Ministries would contribute significantly to developing actions to prevent, minimize and reverse the ten threats to healthy soils and prevent soil and land from misuse and mismanagement.

The development of a national sustainable soil management and monitoring plan would guide the long-term promotion, dissemination and implementation of climate-friendly agricultural practices across Turkey and support the alignment of national land use programs with SSM. A well-developed soil management and monitoring plan should focus on solving socio-economic challenges through participatory approaches in collaboration with producer communities, institutions and organizations. It should further support national actions towards achieving the Sustainable Development Goals within the scope of the three Rio Conventions and other global initiatives and commitments.

All actions related to SSM prioritization, implementation and monitoring would require appropriate biophysical and socio-economic indicators to be identified and measured at relevant intervals. Such indicators should be simple and easy to measure, and should be aligned with existing indicators used in international conventions, programs and the 2030 Sustainable Development Agenda. The monitoring of relevant indicators will be conducted and managed through the TSIS as discussed under Target 5.

In order to facilitate increased implementation of sustainable soil management (SSM), it is essential that the soil threats be considered in both the planning and implementation phases of land use and management at all levels (i.e. national, regional and local levels), but particularly in rural areas to prevent soil and land misuse and mismanagement. To support farm-level implementation of SSM, agricultural support and incentive programs require adjustment to base their allocation on existing SSM approaches, indicators and criteria.

The following actions have been identified to support the establishment of a sustainable soil management framework:

Action T4.1: Developing a national framework to ensure the sustainable management and monitoring of soils under different land uses.

Activity T4.1.1. Applying and customizing the GSP/ITPS guidelines for the assessment of SSM in selected pilot watersheds to develop site-specific soil management and monitoring plans.

Activity T4.1.2. Applying the customized methodology in all agricultural, grassland and forest land use systems to develop a national soil management and monitoring plan.

Activity T4.1.3. Incorporating all relevant indicators into the TSIS for SSM monitoring as part of an SSM framework.

Activity T4.1.4. Adjusting existing agricultural support and incentive programs to incorporate selected SSM indicators in program criteria for allocation and monitoring.

Activity 4.1.5. Integrating SSM indicators into agricultural land use plans, pasture improvement and management projects, forest management plans, as well as consolidation, irrigation and on-farm development services projects.

