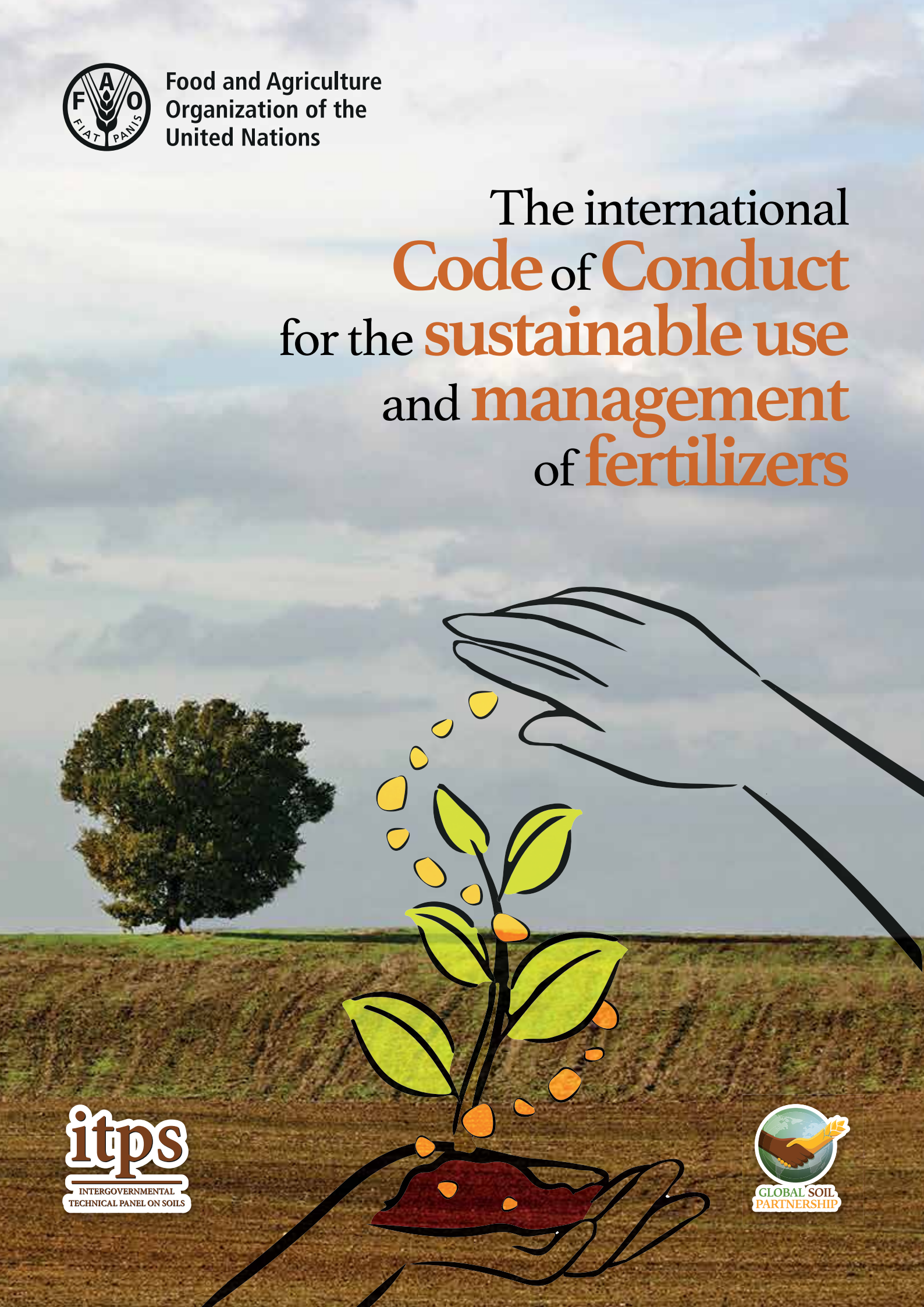
Food and Agriculture Organization of the United Nations

The international Code of Conduct for the sustainable use and management of fertilizers



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INTERGOVERNMENTAL TECHNICAL PANEL ON SOILS

GLOBAL SOIL PARTNERSHIP

The international Code of Conduct for the sustainable use and management of fertilizers

Food and Agriculture Organization of the United Nations
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Foreword

Soils are the vital source of most of our food: if we are to ensure global food security and nutrition, it is crucial that they be nurtured and protected. Given soils' direct association with crops and trees, sustainable soil management is a natural priority for the agricultural and forestry sectors. Soils also provide other important ecosystem services, such as water purification and nutrient cycling, climate regulation and flood prevention. Sustainable soil management is thus of great importance to food production in the aquaculture and fishing industries, as well as to the environment and health sectors.

A particular challenge associated with managing soils to produce food and provide other ecosystem services is the management of nutrients. This comes with two seemingly contradictory risks: on the one hand, the greenhouse gas emissions and pollution of soils and waterways caused by overuse or misuse of fertilizers; on the other, the low yields associated with underusing fertilizers. These risks are all the more severe in light of a rapidly increasing population, a changing climate, the growing frequency of natural disasters and the worsening degradation of natural capital.

As part of its efforts to achieve the 2030 Agenda for Sustainable Development, the Post-2020 Agenda and Land Degradation Neutrality (which aims to maintain or increase the amount and quality of land resources that support ecosystem functions and services), FAO has established the Global Soil Partnership. This promotes sustainable soil management as a means to achieve food security and nutrition while protecting the environment.

The Partnership has produced Voluntary Guidelines for Sustainable Soil Management. Their role is to guide strategic and context-specific decision-making on soils at all relevant levels to address major global threats, such as the imbalance of nutrients and nutrient cycles, and the pollution of soils.

The International Code of Conduct for the Sustainable Use and Management of Fertilizers is an important tool for implementing the Voluntary Guidelines, with special regard to nutrient imbalances and soil pollution. The Code promotes practices including nutrient recycling, and agronomic and land management to improve soil health; and recommends regulation related to the sale, distribution and labelling of fertilizer products wherever appropriate. It also promotes capacity development and education programs for all stakeholders involved in the fertilizer value chain, and encourages developed countries to assist others in developing infrastructures and capacity to manage fertilizers throughout their life cycle.

It is hoped that governments, industry, farmers, traders and civil society in general will make use of the framework provided in the Fertilizer Code and of the guidelines pertaining to their respective fields as they assign roles, responsibilities and actions to ensure that fertilizers are used sustainably, efficiently and with minimal negative effects on the environment.

If widely implemented as a multi-stakeholder tool, the Code can greatly smooth the path towards the Sustainable Development Goals, Land Degradation Neutrality and protecting soil biodiversity – all the while maintaining healthy, fertile and productive soils, and producing sufficient nutritious food to meet the future needs of all.

Mr. José Graziano da Silva

Former FAO Director-General

Executive summary

The International Code of Conduct for the Sustainable Use and Management of Fertilizers was developed in response to the Committee on Agriculture's (COAG) request to increase food safety and the safe use of fertilizers. It is also a response to the third United Nations Environment Assembly (UNEA3) declaration on soil pollution, while ensuring enhanced support to the implementation of the Voluntary Guidelines for Sustainable Soil Management (VGSSM). The Fertilizer Code aims to address issues of global importance, thereby contributing to the implementation of the Sustainable Development Goals (SDGs).

It essentially provides a locally adaptable framework and a voluntary set of practices to serve the different stakeholders directly or indirectly involved with fertilizers.

It is expected that these stakeholders will contribute to sustainable agriculture and food security from a nutrient management perspective, by adhering to and implementing the principles mentioned in this Fertilizer Code.

The Fertilizer Code is the result of an exhaustive consultation process, which was initiated in December 2017 and unfolded until February 2019, as recommended by the COAG's Bureau. As requested by the 6th Plenary Assembly (PA) of the Global Soil Partnership (GSP), by the 26th session of the COAG and by the 160th session of the FAO Council, the current text takes account of the feedback and comments received during this thorough consultation process. The Fertilizer Code was finally endorsed by the 41st session of the FAO Conference in June 2019.

Background

Fertilizers, including those from mineral, synthetic and organic sources, are important and widely used inputs in agriculture helping contribute to global food security, farmer livelihoods and essential human nutrition. In addition, the judicious use of fertilizers may contribute to preventing deforestation and other land use changes by increasing agricultural productivity, and therefore reducing the need for additional land for cultivation. They can also prevent soil degradation and crop failure, especially related to nutrient mining and the absence or underuse of key plant nutrients. However, fertilizers may also have negative impacts on the environment, human, animal, and soil health.

At a regional level, fertilizers are subject to various legislation and regulations related to production, trade, distribution, marketing, safety, and use that can vary among, or within, countries. Responsible use and management of fertilizers at the farm level requires careful consideration of many parameters including the crop to be grown, soil type and condition, previous agronomic activities, water application, climate, farm economics, nutrient content and characteristics of the fertilizer, as well as access to fertilizer. In addition, the use of fertilizers must be considered at the landscape, regional and global levels due to potential nutrient losses to the environment and the corresponding negative effects of such losses. As such, there is a need for a holistic approach to the use of nutrients and their cycles in soils, plants, animals, humans, water and the environment.

This document is an International Code of Conduct for the Sustainable Use and Management of Fertilizers designed to support and implement the VGSSM. It aims to assist countries address the multiple and complex issues related to the responsible use and management of fertilizers in agriculture at the farm, ecosystem and national level. The Fertilizer Code also aims to address issues of a global perspective in terms of contributing to the SDGs. These include ensuring sustainable food production systems, ending hunger and malnutrition, enhancing food security and nutrition, reducing pollution and improving food safety. The Fertilizer Code addresses the judicious use and management of fertilizers to prevent inappropriate use, underuse and overuse.

Preamble and introduction

Fertilizers make a significant contribution towards sustaining the population of the world by supporting food security, enhancing farmer livelihoods, providing essential human nutrition, providing nutrients for the production of renewable materials such as timber, fibre and biofuels, and play a role in reducing the conversion of land from native ecosystems or other uses with beneficial ecosystem services to agricultural production. Fertilizers dramatically increase the availability of crop nutrition, thus can improve ecosystem services of the soils that contribute, directly and indirectly, to 95 percent of global food production. Proper use of nutrients may also promote biomass production and contribute to increased soil organic matter and soil health. However, impacts of fertilizers, if not properly used, include contribution to global climate change, degradation of soil and water resources and air quality, soil-nutrient depletion and potential harm to human, animal and soil health. Some studies have highlighted that perturbations to the biogeochemical flows of nitrogen and phosphorus due to their production for agricultural use have exceeded safe margins for human activities. Overall, the intent of this document is to maximize the benefits from utilizing fertilizers while minimizing negative impacts. Inherent in all discussion is the need to preserve the soil itself, through the minimization of soil erosion in all forms, to be consistent with sustainable soil management (SSM) practices including the sustainable replenishment of soil nutrients. The Fertilizer Code addresses the issue of nutrient imbalance preventing both the underuse and overuse of fertilizers equally, as identified in the Status of the World's Soil Resources report.

The United Nations (UN) Agencies and their Member Countries are working towards achieving the vision of the 2030 Agenda for Sustainable Development and its 17 SDGs and Land Degradation Neutrality by responding with various actions and recommendations in relation to sustainable soil and nutrient management.

The COAG, during its 25th Session held 26-30 September 2016, requested the Food and Agriculture Organization of the United Nations (FAO) to "intensify its food safety work and technical support to smallholders at the local level concerning the safe use of fertilizers and pesticides" (FAO, 2016).

The recent Status of the World's Soil Resources (FAO & ITPS, 2015) report, published by FAO and the Intergovernmental Technical Panel on Soils (ITPS) identified ten major threats to soils that need to be addressed if the SDGs are to be achieved (FAO and ITPS, 2015). Soils contribute, directly or indirectly, to a number of SDGs (numbers 2, 3, 6, 13, and 15) pertaining to hunger, human health through nutrition, clean water, climate change, and life on land. The Global Soil Partnership (GSP) and FAO subsequently produced the VGSSM as a first step to addressing these threats, two of which are 'nutrient imbalances' and 'soil pollution' and involve fertilizer applications that can be excessive, insufficient or polluting (none of which are sustainable) (FAO, 2017). The relevant chapters in the VGSSM (**3.3** - Foster nutrient balances and cycles, and **3.5** - Prevent and minimize soil contamination) provide initial guidance on promoting sustainable nutrient use in relation to soils, agriculture and the environment, but further support and guidance is required to implement these recommendations.

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In addition, a declaration on managing soil pollution to achieve sustainable development was adopted in the recent UNEA 3 held in Nairobi in December 2017 (UN Environment, 2017). The resolution explicitly expressed concerns about soil pollution emanating from improper use of fertilizers in agricultural production.

During the 7th ITPS working session, 30 October - 3 November 2017, FAO and the ITPS agreed to develop an International Code of Conduct for the Sustainable Use and Management of Fertilizers, hereafter referred to as the 'Fertilizer Code':

I. in response to COAG's request to increase food safety and the safe use of fertilizers;

II. to facilitate the implementation of the VGSSM to address nutrient imbalance and soil pollution; and

III. to respond to the UNEA3 declaration on soil pollution.

Inputs to, and feedback on the contents and objectives of the Fertilizer Code were obtained from a broad range of stakeholders during an online consultation that was open to the public from 21 December 2017 to 11 February 2018. The feedback generated in the forum was used to produce a zero-draft Fertilizer Code with the support and guidance of the ITPS, as well as from various experts within FAO. The zero-draft was reviewed by an open-ended working group (OEWG) of experts in the field of fertilizer management and policy, 7-9 May 2018. The OEWG constituted persons selected by member countries to represent the regions, as well as representatives from the fertilizer industry, academia, the research community and civil society. For a list of members and their affiliations refer to Annex 1.

The Fertilizer Code was presented to the 6th GSP PA, 11-13 June 2018. Upon recommendation by the GSP Plenary, the document underwent another consultation for final review and comment from 15 June to 15 July 2018.

After the consultation, the Fertilizer Code was then submitted to the 26th session of COAG (1-5 October 2018). The Committee provided a number of comments, queries and suggestions for improvement to the document, in particular to better take into account regional specificities. The Committee mandated its Bureau to undertake an additional inclusive consultation process to prepare a revised text to be submitted to the FAO Council at its next session.

During the 5th consultation process, member countries provided some comments to improve the Fertilizer Code, which were included in a new version that then was submitted for consideration by the 41st Session of the FAO Conference.

The International Code of Conduct for the Sustainable Use and Management of Fertilizers provides a locally adaptable framework and voluntary set of practices with which governments, the fertilizer industry, agricultural extension and advisory services (AEAS), supporting academic and research institutions, actors in the nutrient recycling industry, civil society and end-users can contribute to sustainable agriculture and food security from a nutrient management perspective by following or adhering to the guidelines and recommendations provided.

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Article 1.
Scope, Goals, and Objectives

1.1. The International Code of Conduct for the Use and Management of Fertilizers, also referred to as the "Fertilizer Code", is a set of voluntary practices and agreed-upon expectations for behaviour by various stakeholders in the use and management of plant nutrients.

1.2. This Fertilizer Code is complementary to the VGSSM and should be read in this systems framework. Appropriate fertilization must take into account the global farm system (crop rotation and combination, soil, labour, markets, etc.) as well as climatic and hydrological conditions.

1.3. The stakeholders to which the Fertilizer Code is addressed include governments, policy makers, the fertilizer industry, the waste and recycling industry, National Agricultural Research Systems (NARS), universities, agricultural and analytical service laboratories, AEAS, civil society and users of fertilizers, especially farmers.

1.4. When using the term 'fertilizer' we refer to a chemical or natural substance or material that is used to provide nutrients to plants, usually via application to the soil, but also to foliage or through water in rice systems, fertigation or hydroponics or aquaculture operations. Thus, multiple nutrient types and sources are considered within this Fertilizer Code and include: chemical and mineral fertilizers; organic fertilizers such as livestock manures and composts; and sources of recycled nutrients such as wastewater, sewage sludge, digestates and other processed wastes.

1.5. The intent of the Fertilizer Code is to assist stakeholders in the establishment of systems for monitoring the production, distribution (including sale), quality, management and use of fertilizers to achieve sustainable agriculture and the SDGs by promoting integrated, efficient and effective use of quality fertilizers with the following outcomes:

1.5.1. Help ensure global food production and food security while maintaining soil fertility, ecosystem services and protecting the environment;

1.5.2. Optimize the effective and efficient use of fertilizers to meet agricultural demands while minimizing nutrient losses to the environment;

1.5.3. Emphasize the need for fertilizers, especially in underserved areas (or areas with underuse of plant nutrients);

1.5.4. Preserve ecosystem services and minimize environmental impacts from the use of fertilizers including soil and water pollution, ammonia volatilization, greenhouse gas emissions and other nutrient loss mechanisms;

1.5.5. Maximize the potential economic and environmental benefits accrued from sustainable use of fertilizers, including reducing the need for additional land to be brought into production, increased carbon storage in soils, and improvements in soil health;

1.5.6. Avoid excess nutrients in ground and surface waters that negatively impact human and animal health;

1.5.7. Avoid additions of contaminants in fertilizers that have negative impacts on and potential toxicity to soil, soil biodiversity as well as animal and human health;

1.5.8. Maintain and improve food safety, diets, nutritional quality and human health through optimal use of plant nutrients;

1.5.9. Stimulate and improve the recycling of nutrients.

1.6. The objectives of the Fertilizer Code are to:

1.6.1. Provide a set of voluntary standards of practice for all stakeholders involved in the use and management of fertilizers, including governments, the fertilizer industry, the waste and recycling industry, farmers and other end users, AEAS, the private sector, academia and research and other public entities;

1.6.2. Encourage cooperation and collaboration between all stakeholders involved in the fertilizer value chain and waste and recycling industry for the responsible and sustainable development, production, use and management of fertilizers and reused and recycled nutrients;

1.6.3. Promote transparency, collaboration, partnership and information exchange among all stakeholders regarding the access to and use of fertilizers [consistent with legal competition obligations];

1.6.4. Promote safe recycling of nutrients for agricultural and other land uses to reduce the environmental and human, animal and soil health impacts of excess nutrients in the biosphere, atmosphere and hydrosphere;

1.6.5. Inspire governments, research, the private sector and civil society to promote and fund innovation in sustainable agricultural practices, technologies and management so as to improve soil fertility and nutrient management;

1.6.6. Assist countries and regions to control and enforce fertilizer quality through appropriate regulatory mechanisms and reducing economic losses to end users;

1.6.7. Improve fertilizer safety and reduce the risks to human and animal health;

1.6.8. Encourage the promotion and dissemination of knowledge, including comparable statistics, on all matters related to fertilizer use and management through appropriate mechanisms, institutions and outreach programmes;

1.6.9. Encourage Integrated Soil Fertility Management (ISFM) using nutrients from a range of safe sources;

1.7. This Fertilizer Code is a living document and should be regularly reviewed by FAO upon implementation, and updated every five to ten years, or when and where deemed appropriate by Member Countries and through the appropriate FAO governing bodies.

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Article 2.
Terms and Definitions

Agricultural extension and advisory services (AEAS): refers to any organization in the public or private sectors (non-governmental organizations or NGOs, farmer organizations, private firms, etc.) that facilitates farmers' and other rural actors' access to knowledge, information and technologies, and their interactions with other actors; and assists them to develop their own technical, organizational and management skills and practices, so as to improve their livelihoods and well-being.

Agroforestry: the collective term for land-use systems and technologies in which woody perennials (e.g. trees, shrubs, palms or bamboos) and agricultural crops or animals are used deliberately on the same parcel of land in some form of spatial and temporal arrangement.

Advertising: the promotion of the responsible sale and use of fertilizers by printed and electronic media, social media, signs, displays, gifts, demonstration or word of mouth.

Ammonia volatilization: the loss of nitrogen to the atmosphere in the form of ammonia after applications of fertilizers.

Animal manure: materials from livestock production operations used for fertilization purposes, including manure, urine, slurry, straw and other bedding materials.

Application rate: the quantity of fertilizer applied per unit area including an element of time, for example per growing season or year.

Biodiversity: the diversity among living organisms, which is essential to ecosystems function and services delivery.

Biofertilizer: a broad term used for products containing living or dormant micro-organisms such as bacteria, fungi, actinomycetes and algae, alone or in combination, which on application help in fixing atmospheric nitrogen or solubilize/mobilize soil nutrients.

Biostimulant: product that stimulates plant growth through the synthesis of growth-promoting substances and/or plant nutrition processes independently of nutrient content, with the aim of improving one or more of: the plants' nutrient use efficiency or uptake; plant tolerance to abiotic stress; or, crop quality traits.

Civil society: is made up of citizens and people from different regions around the world organized into constituencies, associations and groups to make their voices heard.

Civil society organization (CSO): FAO considers CSOs as the non-state actors that fit within three main categories: Member-based organizations (MBOs); NGOs; and Social movements (SMs) that work in areas related to FAO's mandate. Due to their varied nature, categorizing CSOs into distinct groups is a challenge and overlap is likely to exist.

Contaminant: substance contained within fertilizers that is not a plant nutrient. May include, but is not limited to, heavy metals, pathogens and industrial by-products.

Compost: a mixture of decaying organic matter, as from leaves and manure, used to improve soil structure through the addition of carbon and provide nutrients.

Digestate: material remaining after various digestion processes have been applied to biomass or waste products such as livestock manures, sewage sludge and urban wastes.

Disposal: any operation to dispose, recycle, neutralize, or isolate fertilizers and byproducts, containers and contaminated materials.

Distribution: the process by which fertilizers are supplied and transported through trade channels to local, national or international markets and lands.

Ecosystem: ecological system consisting of all the organisms in an area and the physical environment with which they interact.

Ecosystem services: the multitude of benefits that nature provides to society.

Eutrophication: the excessive enrichment of surface waters with plant nutrients, primarily N and P.

Fertigation: the application of a plant nutrient, soil amendment, or reclaimed water from food processing and wastewater treatment facilities with irrigation water.

Fertilizer: a substance that is used to provide nutrients to plants, usually via application to the soil, but also to foliage or through water in rice systems, fertigation, hydroponics or aquaculture operations. Further elaborated in Article 1.4.

Fertilizer additives: substances added to or modifications of fertilizers, or products added to the soil, designed to increase fertilizer use efficiency through a variety of actions including, but not limited to, reductions in fertilizer solubility and nutrient release, coatings of fertilizer granules, inhibition of nitrification or urea hydrolysis, or stimulation of soil microorganisms.

Fertilizer application: unless specified otherwise, 'application of fertilizer(s)' or 'fertilizer application' refers to the application of nutrients for the benefit of plant growth in general, and not to any specific type of fertilizer. It includes applications for agricultural and other purposes, including recreational and sporting facilities, public and private gardens and lawns.

Fertilizer grade or plant available nutrient content: the total amount of a plant nutrient in a fertilizer that is considered available for plant uptake.

Fertilizer industry: the entire value-chain involved in producing and supplying fertilizers, including basic production or mining, processing into final products, transportation, storage, and ultimate delivery to the fertilizer user.

Fertilizer management: the regulation and technical control of all aspects of fertilizers, including production (manufacture and formulation), authorization, import, export, labeling, distribution, sale, supply, transport, storage, handling, application and disposal of fertilizers to ensure safety, quality and use efficacy and to minimize adverse health and environmental effects and human and animal exposure.

Fertilizer misuse: can involve, but is not limited to, the application of one or more plant nutrients to the soil, foliage or water that would not reasonably be expected to produce a positive response on crop growth and development, fertilizer spills, or the application of contaminants to the soil that might pose risk to human health or the environment. Further elaborated in Article 4.5.5.

Fertilizer use efficiency: an estimate or determination of the amount of nutrients in a fertilizer that are taken up by the crop after the fertilizer is applied to the soil as a proportion of the amount added. This can be for the crop grown after the initial fertilizer application is made or after one or more crops are grown.

Fertilizer user: persons who apply fertilizers for the specific purpose of making plant nutrients available for plant uptake. Fertilizer users can include farmers, land managers and food producers, public or private organizations maintaining parks, gardens and sporting facilities and persons using fertilizers for home gardening purposes.

Green manure: plants that are grown in order to provide soil cover and to improve the physical, chemical, and biological characteristics of soil.

Groundwater: all water which is below the surface of the ground in the saturation zone and in direct contact with the subsoil.

Inorganic fertilizer: a nutrient-rich fertilizer produced industrially by chemical processes, mineral extraction or by mechanical grinding. Note that though urea is technically an organic material, it is referred to within this Fertilizer Code as an inorganic fertilizer.

Integrated soil fertility management (ISFM): the application of soil fertility management practices and the knowledge to adapt these to local conditions, which optimize fertilizer and organic resource use efficiency and crop productivity.

International Organization: includes intergovernmental organizations of the UN, UN Specialized Agencies and Programmes, Development Banks, International Agricultural Research Centres including CGIAR Member Centres, and international NGOs.

Liming material: substances added to the soil to eliminate excess acidity.

Marketing: the overall process of product promotion, including advertising, product public relations and information services, as well as the distribution and sale on local and international markets.

National Agriculture Research System (NARS): cross section of stakeholders comprising of public agricultural research institutes, universities and other tertiary institutions, farmer groups, CSOs, private sector and any other entity engaged in the provision of agricultural research services at national scale.

Nitrification inhibitor: substance that inhibits biological oxidation of ammoniacal nitrogen to nitrate.

Non-governmental organization (NGO): is a formally constituted, legally registered, free from commercial interest, non-profit organization that provide services, information and expertise, sensitize public opinion, and conduct advocacy activities.

Organic fertilizer: a carbon-rich fertilizer derived from organic materials, including treated or untreated livestock manures, compost, vermicompost, sewage sludge and other organic materials or mixed materials used to supply nutrients to soils.

Plant nutrients: elements essential for normal growth and reproduction of plants, generally not including carbon, hydrogen,

and oxygen. Plant nutrients include the primary nutrients nitrogen, phosphorus and potassium, and others including sulfur, calcium, magnesium, boron, chlorine, copper, iron, manganese, molybdenum, zinc and others.

Recycled nutrient: plant nutrients applied to and taken up by growing plants that can be returned to the plant nutrient cycle after consumption by humans or animals, as by-products of food processing, or as plant residues returned to the soil.

Risk: the probability and severity of an adverse health or environmental effect occurring as a function of a hazard and the likelihood of exposure to fertilizers, to soil impacted by fertilizer applications, or to fertilizer misuse, including inappropriate application of fertilizers.

Sewage sludge: solid materials removed from the wastewater stream originating from a public sewage system. May or may not be subject to additional treatment to reduce volume, pathogens, odours, and nutrient content.

Soil contamination: occurs when the concentration of a chemical or substance is higher than would occur naturally but is not necessarily causing harm.

Soil fertility: the ability of a soil to sustain plant growth by providing essential plant nutrients and favourable chemical, physical, and biological characteristics as a habitat for plant growth.

Soil health: "The capacity of soil to function as a living system. Healthy soils maintain a diverse community of soil organisms that help to control plant disease, insect and weed pests, form beneficial symbiotic associations with plant roots, recycle essential plant nutrients, improve soil structure with positive repercussions for soil water and nutrient holding capacity, and ultimately improve crop production."

Soil pollution: refers to the presence of a chemical or substance out of place and/or present at higher than normal concentration that has adverse effects on non-target organisms.

Stakeholder: refers to various actors involved in the production, handling, management, regulation and use of fertilizers and includes governments, policy makers, the fertilizer industry, the waste and recycling industry, NARS, AEAS, NGOs, agricultural and analytical service laboratories, farmer organizations and other civil society, farmers and other end users.

Struvite: a phosphate fertilizer used in agricultural production as an alternative source of rock phosphate that also contains nitrogen and magnesium. Struvite can come from recycled sources or waste residues such as wastewater or urine.

Sustainable soil management (SSM): "Soil management is 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 balance between the supporting and provisioning services for plant production and the regulating services the soil provides for water quality and availability and for atmospheric greenhouse gas composition is a particular concern."

Urease inhibitor: substance that inhibits urease enzyme's hydrolytic action on urea.

Wastewater: water, which is of no further immediate value to the purpose for which it was used or in the pursuit of which it was produced because of its quality, quantity or time of occurrence.

4R nutrient stewardship: a framework to achieve cropping system goals, such as increased production, increased farmer profitability, enhanced environmental protection and improved sustainability by incorporating the right fertilizer source at the right rate, at the right time and in the right place.

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Article 3.
Soil fertility and plant nutrition

3.1. With regard to fertilizer management decisions, strong consideration should be given to the capacity of soil to retain and supply plant nutrients, the ability to support plant growth and crop demands for nutrients as well as water availability.

3.2. Soil considerations include its origin, composition and classification, as well as previous management practices that influence the chemical, physical and biological properties that contribute to its fertility.

3.3. Plant nutrition considerations include previous and anticipated crop demand for all nutrients, unique nutrient requirements of the crop and cultivar to be grown (including the timing of such requirement during the plant growth phase), and desired nutritional composition of the crop and cultivar to be grown. Further, the cultivar to be grown should be adapted to local environmental, soil fertility, water availability and sanitary conditions.

3.4. There are many sources of plant nutrients available and they should be considered as complimentary rather than exclusive to one another. There are many benefits to providing one or more plant nutrients from multiple sources including, but not limited to, extended nutrient availability for plant growth, organic matter additions to soil and the avoidance of nutrient deficiencies or excesses with the combination of organic and inorganic fertilizers.

3.5. Governments should, based on the most recent scientific analysis, evidence and research and drawing on global cooperation, international standards and best practices, and in partnership with the fertilizer industry and other stakeholders:

3.5.1. Encourage land use and land tenure policies that incentivize farmers to improve soil fertility and soil health and thus, in some situations, indirectly discourage conversion of land from native or protected ecosystems or other uses with beneficial ecosystem services into agricultural production;

3.5.2. Encourage soil conservation through relevant policies and incentives to offset reductions in soil fertility due to the loss of fertile topsoil through erosion or other types of soil degradation such as salinization, acidification, alkalization and pollution;

3.5.3. Ensure that the analytical means for assessing plant nutrient status and basic soil chemical properties such as pH, salinity and other soil parameters, are available and utilized in making fertilizer recommendations based on the assessment of plant nutrient status and/or soil properties at a given location. Public and private laboratory services, or a combination, can be utilized to meet these needs. Analytical means can include traditional laboratory- based (for example, wet-chemical) procedures, other field or laboratory-based modern methods (for example, spectroscopy), or properly calibrated field testing kits;

3.5.4. Promote the use of soil and plant tissue testing, and other means of assessing soil fertility status, by farmers and farmer advisors to determine fertilizer needs before applying fertilizers. Public campaigns, educational materials, and demonstrations are example promotion methods;

3.5.5. Develop and encourage the use of geospatial methods or in-situ soil testing for efficient and effective use of fertilizers;

3.5.6. Where necessary, provide government support for extension/outreach activities that develop evidence-based fertilizer recommendations based on relevant soil characteristics, existing nutrient pools, crop and cultivar to be grown, nutrient considerations for previous crop(s) grown, expected yield and quality, local experience and other site-specific information such as climatic and hydrological conditions;

3.5.7. Where necessary, facilitate infrastructure development for drainage or irrigation, or promote access to and affordability for key crop production inputs that can limit plant response to nutrient additions such as liming materials or gypsum.

3.6. Through their NARS and Agricultural Extension and AEAS, in collaboration with international research centres, other research organizations, universities and industry, governments should:

3.6.1. Encourage integrated farming practices and agroforestry with ISFM through the use of all relevant sources of plant nutrients including animal manures, compost, crop residues, and other materials, particularly those that are locally available;

3.6.2. Further through ISFM, encourage the use of crop rotations, pulses and other legumes, cover crops, and other green manures as a means to enhance soil health and fertility;

3.6.3. Encourage the use of plant nutrition considerations such as the previous and anticipated crop demand for all nutrients, unique nutrient requirements of a crop and cultivar to be grown, and desired nutritional composition of the crop and cultivar to be grown in soil fertility management. Promote the use of cultivars that are adapted to local environmental (including climatic and hydrological) and soil fertility conditions;

3.6.4. Promote the correction or management of soil conditions that prevent crop response to plant nutrient additions. Such conditions would include extreme acidity or alkalinity, excessive salts or sodium, or lack of organic matter that limits nutrient cycling;

3.6.5. Establish evidence-based limits for nutrient levels from all sources (including reused/recycled materials) in soils (for example phosphorus), or nutrient application limits to soils (for example nitrogen), above which additional applications are prohibited or limited due to a low probability of a positive crop response and a high probability of negative environmental impacts on surface water resources;

3.6.5 Establish evidence-based maximum limits for contaminants from fertilizers in soils (for example heavy metals), above which trade and use of fertilizer is controlled due to high probability of soil pollution;

3.6.6. Develop and refine evidence-based fertilizer recommendations at the local and regional levels based on relevant soil characteristics,

crops to be grown, previous crops grown, expected yield and quality, and other site-specific information such as climatic and hydrological conditions to promote balanced application of plant nutrients proportional to expected crop absorption and nutrient export from the production site;

3.6.7. Develop and refine adapted soil testing methods including local indicators of soil health in the interest of advancing the adoption and efficient use of fertilizers;

3.6.8. Develop and refine the use of geospatial methods and precision application equipment with the goal of advancing the efficient use of fertilizers;

3.6.9. Work with agricultural economists to define economically optimum fertilizer application rates and incorporate that information into outreach and extension programmes.

3.7. The fertilizer industry should:

3.7.1. Produce high quality fertilizers that comply with the legislation that is in force in the country where the product is placed on the market;

3.7.2. Encourage fertilizer recommendations that consider all nutrient requirements and are based on site-specific information including relevant soil characteristics, crops and cultivars to be grown, previous crops grown, and expected yields, and if using soil testing methods, that the methods are calibrated for the particular soil;

3.7.3. Promote the application of fertilizers at the proper time and amount, as well as use of the most appropriate fertilizer source and placement in accordance with global principles of plant nutrient management such as ISFM and 4R nutrient stewardship;

3.7.4. Provide adequate training of retail sales and technical staff to promote proper soil and plant tissue testing and fertilizer best management practices that maximize the efficient use of plant nutrients while avoiding off-site environmental effects;

3.7.5. Develop and encourage the use of geospatial methods or in-situ soil testing for efficient and effective use of fertilizers and identification of suitable fertilizer formulations;

3.7.6. Carefully develop and evaluate fertilizer additives (for example, nitrification inhibitors, urease inhibitors, biostimulants) and market these only when demonstrated to be safe for soil biota, the environment, animal health and human health, as well as effective in increasing fertilizer use efficiency and/or for the reduction of off-site environmental impacts;

3.7.7. Continue to seek innovations in fertilizers and technologies for providing adequate plant nutrition while ensuring soil health, environmental health, animal health and human health and safety;

3.7.8. Ensure transparency regarding fertilizer uses and impacts, and develop communication material regarding appropriate utilization, adapted to the final users (including use of local/applicable languages) by proper labelling of the product;

3.7.9. Promote the correction or management of soil conditions that prevent crop response to plant nutrient additions. Such conditions would include extreme acidity or alkalinity, excessive salts, carbonates or sodium, or lack of organic matter that limits nutrient cycling;

3.7.10. Wherever possible, partner with governments, NARS, universities, AEAS, international research centres, and other research organizations towards the goal of maximizing the beneficial effects of fertilizer use while minimizing negative impacts.

3.8 Fertilizer users should:

3.8.1. Purchase and use high quality fertilizers that comply with the legislation in force in the country where the product is placed on the market;

3.8.2. First correct and/or manage soil conditions that prevent crop response to plant nutrient additions or limit nutrient cycling. Such conditions would include extreme acidity or alkalinity, excessive salts or sodium, or lack of organic matter;

3.8.3. When available, utilize soil testing to identify and quantify soil conditions that might limit crop response to plant nutrient additions and for the determination of fertilizer recommendations;

3.8.4. Utilize fertilizer recommendations by local AEAS and outreach providers that are based on site-specific information including relevant soil characteristics, crop and cultivar to be grown, previous crop grown, expected yields, as well as climatic and hydrological conditions;

3.8.5. Apply fertilizers at the proper time and amount, as well as use of the most appropriate fertilizer source and placement in accordance with global principles of plant nutrient management such as ISFM and 4R nutrient stewardship;

3.8.6. Practice ISFM, as appropriate, through integrated farming practices and agroforestry and use of all relevant sources of plant nutrients including animal manures, compost, crop residues, and other materials, particularly those that are locally available;

3.8.7. Further, and where possible, use crop rotations, pulses and other legumes, cover crops and other green manures as a means to enhance soil health and fertility.

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Article 4.
Fertilizer use and management

4.1. Proper management and use of fertilizers is the responsible handling, storage, transportation, and application of fertilizers with the express goal of enhancing plant growth or attributes (nutritional content, colour, flavour, and so on) while maintaining or improving soil health and minimizing any potential environmental impacts.

4.2. Fertilizer nutrients that are not taken up by plants or retained in soils may be transported to groundwater by leaching causing potential human health impacts, or to waterways by soil erosion or fertilizer misuse, especially nitrogen and phosphorus, causing eutrophication and deterioration of water quality. Excess nutrients may also be released from soils to the atmosphere through ammonia volatilization or as greenhouse gas emissions of nitrous oxide. In addition, excess fertilizer application and losses of nutrients due to the misuse of fertilizers can lower profits of farmers and in some cases can lead to crop failure.

4.3. Insufficient use of fertilizers entails adding nutrients at levels below crop requirement and results in opportunity costs for yield potential, nutritional content, return of carbon to the soil, and enhancement of soil health as well as net nutrient removal from the soil system.

4.4. A holistic approach must be taken when developing and implementing best management practices for fertilizer use, recognizing that practices to reduce the negative impacts from one nutrient loss pathway may increase the negative impacts from other nutrient loss pathways. In this case, the best management practices that produce the most positive overall effect should be adopted.

4.5. Misuse of fertilizers can involve, but is not limited to:

4.5.1. Over or excessive use, that is, the application of one or more plant nutrients to the soil, foliage or water that would not reasonably be expected to produce a positive response in growth or composition for plants or crops growing in that soil, or to maintain soil health;

4.5.2. Underuse or no use, that is, the lack of incorporation of plant nutrients to replenish the soils, for the benefit of the next crop to be grown. This situation is particularly sensitive in soils where nutrient mining is a common process negatively impacting food production;

4.5.3. Improper or inappropriate use, such as the application of fertilizers to the soil surface when not appropriate, not suited to the soil type, soil properties or the landscape (such as erosion risk due to slope), crop requirement, or the prevailing weather and climatic conditions, or by unsuitable application methods, thus resulting in nutrient losses to the environment, including soil, water and air pollution;

4.5.4. Nutrient imbalance resulting from fertilizers composed of an incomplete or improperly balanced nutritional profile compared to what the target crop(s) in question requires for optimal growth and product quality;

4.5.5. The application, or cumulative application, of contaminants to the soil via fertilizers that might pose unacceptable risk to human, animal and soil health or the environment;

4.5.6. Improper storage or handling of fertilizers that results in degradation of chemical or physical properties, unsafe or unhealthy conditions for users, diversion to non-agricultural uses, theft, or harm to the environment; or

4.5.7. Fertilizer leaks or spills.

4.6. Entities addressed by the Fertilizer Code should consider all available facts on the negative impacts of the misuse of fertilizers and should promote responsible dissemination of understandable information on fertilizers and their uses, the optimization of positive impacts, the risks, and alternatives when available.

4.7. Governments should, based on the most recent scientific analysis, evidence and research and drawing on global cooperation, international standards and best practices, and in partnership with the fertilizer industry and other stakeholders:

4.7.1. Develop policies that support SSM and the responsible production and use of fertilizers in order to protect soil, improve degraded lands, optimize agricultural production on existing agricultural land, and minimize the conversion of land from native or protected ecosystems or other uses with beneficial ecosystem services into agricultural production;

4.7.2. Support and stimulate, through legislation and incentive measures, the development of holistic and integrated fertilizer solutions for a more balanced crop nutrition and make sure that these are available to the end users;

4.7.3. As needed, develop policies that facilitate affordable access to safe and documented fertilizers by farmers and which are linked with appropriate and relevant fertilizer use policy, guidelines and rural AEAS programmes;

4.7.4. Ensure that any fertilizer provided as a result of subsidies, direct or indirect, or donations are produced and used in a responsible manner according to this Fertilizer Code. Such fertilizers should not encourage or lead to excessive or unjustified use, cause the displacement of management practices or use of other fertilizers that offer greater efficiency and/or with lower environmental impact, and should provide a balanced mix of nutrients for the intended crops;

4.7.5. Draft appropriate legislation to minimize the negative impacts of fertilizer applications to agricultural or other lands, including from the misuse and mishandling of fertilizers, or those related to the production process such as exceeding acceptable limits in terms of contaminants;

4.7.6 Establish evidence-based application limits for nutrients from fertilizers, including inorganic and organic fertilizers, sewage sludge, animal waste and organic residues to avoid damaging effects on the environment, and on human, animal and soil health. Negative nutrient balances should also be taken into account to avoid risk of soil fertility decline due to nutrient mining;

4.7.7. Establish evidence-based output limits from fertilizers, including organic fertilizers, sewage sludge, animal waste and organic residues to avoid damaging effects on the environment, and on human,

animal and soil health;

4.7.8. Maintain databases and statistics on the positive and negative effects of fertilizers (including social, economic and environmental aspects), in coordination with industry and relevant international agencies, such as FAO (FAO, 2018e). Suitably trained personnel and adequate resources should be made available to ensure the reliability and accuracy of data and information collected, avoiding conflict of interests, and respecting privacy and data confidentiality;

4.7.9. As possible, align rules and regulations with national/international standardization systems related to the responsible use of fertilizers (e.g., ISO/TC 134, CEN/TC 260).

4.8. Through their NARS, and in partnership or collaboration with international centres, other relevant research institutions, universities and industry, governments should:

4.8.1. Carry out appropriate research to determine responsible fertilizer and other agronomic management for major soils and crops in their regions;

4.8.2. Evaluate new and existing products sold as fertilizers to validate their effectiveness and safety and seek advancements in nutrient use efficiency. When possible and appropriate, such information should be shared with relevant stakeholders in other countries;

4.8.3. Develop fertilizer management tools to help provide fertilizer users with the information necessary for optimal usage in order to avoid overuse and misuse (source, rate, timing, and method);

4.8.4. Create and disseminate soil maps at relevant scales for the purpose of managing and monitoring fertilizer applications, as well as to identify zones that are particularly vulnerable to the impacts of fertilizer misuse and/or environmental impacts, as well as assist in the interpretation of such maps, to avoid their misuse;

4.8.5. Encourage local participatory field testing trials that integrate valuable local knowledge on soil health and responses to fertilizer use and management, while highlighting the value of co-creation for enhanced relevance, credibility and legitimacy of knowledge sharing processes.

4.9. Through national and regional rural AEAS, and with support of the fertilizer industry, governments should:

4.9.1. Provide locally or regionally relevant and recognized training (in local/applicable languages) to fertilizer users and retailers on fertilizer use with the goal of maximizing the balanced and efficient use of plant nutrients to enhance sustainable agriculture, food safety and nutrition and to maximize the potential environmental benefits accrued from using fertilizers, including, reducing the conversion of land from native or protected ecosystems or other uses with beneficial ecosystem services into agricultural production through increased yields, increasing carbon storage in soils, and improvements in soil health;

4.9.2. Provide local or regionally relevant and recognized training to fertilizer users and fertilizer retailers (in local/applicable languages) to minimize the environmental impacts from the use of fertilizers including pollution by loss of nutrients via runoff, leaching, gaseous emissions, disruption of soil biological processes, and reducing the effects of contaminants on soil, animal, and human health;

4.9.3. Disseminate understandable information (in local/applicable languages) on reducing potential risks to human, animal and soil health associated with fertilizer handling and use.

4.10. The fertilizer industry should:

4.10.1. Develop strategies for more holistic integrated fertilizer solutions aiming at a more balanced crop nutrition, taking crop requirements and local soil conditions into account, and through improved fertilizer compositions with safe composition for soil biota, food and the environment and use of different fertilizer application methods;

4.10.2. Develop, promote and distribute understandable information (in local/applicable languages) on fertilizer best management practices to fertilizer retailers, salespeople, farmers and end-users that are based on the principles of nutrient stewardship and that maximize the efficient use of plant nutrients while minimizing off-site environmental effects;

4.10.3. Generate knowledge and provide understandable information (in local/applicable languages) to fertilizer users on the health and safety aspects of handling and using fertilizers, and how to protect humans and animals from possible adverse effects including impacts of low-level chronic exposure;

4.10.4. Provide users and environmental authorities with information on appropriate remediation measures in case of fertilizer spills;

4.10.5. Wherever possible, collaborate with governments, NARS, universities, AEAS, international research centres, and other research organizations towards the goal of maximizing the beneficial effects of fertilizer use while minimizing negative impacts.

4.11. Fertilizer retailers, salespersons, farmers organizations, analytical laboratories, consultants, and/or end-users should:

4.11.1. Familiarize themselves and comply with locally applicable regulations and limits and follow guidelines relevant to fertilizer use;

4.11.2. Provide correct information and/or adhere to best management practices for fertilizer use including proper handling, storage, transportation and disposal, and follow locally relevant fertilizer recommendations;

4.11.3. Keep records of fertilizer sales and/or fertilizer applications (source, rate, time, and placement) along with other agronomic practices, data and farm records to support governments for the purpose of statistical information on fertilizer use.

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Article 5.
Nutrient reuse and recycling

5.1. Potential sources of nutrients from reused or recycled materials include wastewater, sewage sludge, biosolids, animal manure, urban wastes, composts, vermicomposts, digestates, biochar, inorganic or organic by-products such as struvite, ammonium sulfate and residues from food, agro-industries and other industries.

5.2. The use of nutrients from reused and recycled sources should be encouraged, however consideration should be given to quality, safety and environmental and biosecurity risks associated with managing and using recycled nutrients.

5.3. Governments should, based on the most recent scientific analysis, evidence and research and drawing on global cooperation, international standards and best practices, and in partnership with the fertilizer industry and other stakeholders:

5.3.1. Encourage the reuse and recycling of nutrients through advocacy, dialogue, policy, financial mechanisms and the provision of resources for cross-sectorial innovation and co-creation and sharing of knowledge in nutrient reuse and recycling technologies for use as fertilizers across relevant sectors including agriculture, water, energy and health;

5.3.2. Develop policies that encourage the safe reuse, recycling and utilization of locally-available sources of plant nutrients through the use of animal manures, compost, crop residues, and other materials suitable for application to soil as a source of plant nutrients and which may also contribute to soil quality in terms of organic matter or other soil benefits such as a liming effect;

5.3.3. Set appropriate guidelines and regulations for the use of, and limits on contaminants in, reused and recycled nutrients sources that pose an unacceptable risk to human, animal and soil health and the environment;

5.3.4. Encourage research and development in decontamination of sewage sludge and other sources of recycled nutrients.

5.4. Through their NARS and rural AEAS, supported by collaboration with international research centres and other research organizations, universities and industry, governments should:

5.4.1. Lead and facilitate sharing of information and co-creation of knowledge on reusing and recycling nutrients for agricultural and other plant production purposes between actors in government, industry, academia, research organizations and end-users including land managers and farmers;

5.4.2. Test sources of, and products made from, reused and recycled nutrients to ensure that they provide nutritional and other agronomic benefits to plants and soil without compromising soil health, animal health, human health and safety or the environment;

5.4.3. Encourage and promote nutrient recycling and the use of reused and recycled materials for application to soil as a source of plant nutrients and to enhance soil health and fertility;

5.4.4. Develop technologies for reuse and recycling of nutrients for use as fertilizers;

5.4.5. Ensure available and appropriate information, such as nutritive and contaminant contents, of reused and recycled nutrients sources for use as fertilizers is made available and accessible to the public, including to farmers and other end-users.

5.5. The fertilizer industry, and/or relevant entities from the private sector, should:

5.5.1. Encourage and drive innovation, as well as provide resources, to develop technologies for reuse and recycling of nutrients for safe use as fertilizers;

5.5.2. Work with governments, NARS, universities, research organizations and farmers in developing and testing innovative and safe methods and techniques for reusing and recycling waste and other materials for use as fertilizers;

5.5.3. Actively engage in dialogue, co-creation of knowledge and knowledge-exchange with and between governments, industry, academia, research organizations and clients/ end-users (land managers and farmers) on the reuse and recycling of nutrients as fertilizers.

5.6. Fertilizer retailers, salespersons, farmer organizations and users should:

5.6.1. Familiarize themselves and comply with locally-appropriate regulations and guidelines relevant to the use of reused and recycled materials for use as plant nutrients, including upper limits on nutrient application rates and contaminant loadings;

5.6.2. Adjust application rates of inorganic fertilizers, as appropriate, in consideration of the nutrients that are being recycled;

5.6.3. Utilize application rates, timing, and placement that maximize the availability of recycled plant nutrients to growing crops and minimize potential negative impacts such as nutrient leaching, odours, runoff, or any other undesirable off-site effects.

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Article 6.
Composition, limits and testing

6.1. The onus of testing and ensuring that fertilizers and sources of recycled nutrients are compliant with quality and safety standards lies with both the government, who should oversee, set and regulate standards, and the fertilizer industry who should ensure that fertilizers produced, marketed and sold are compliant, effective and safe.

6.2. Relevant intergovernmental bodies, in partnership with the government and the fertilizer industry, should assist development of fertilizer sampling and testing procedures that are harmonized at regional levels, and ideally at a global level.

6.3. Governments should, based on the most recent scientific analysis, evidence and research and drawing on global cooperation, international standards and best practices, and in partnership with the fertilizer industry and other stakeholders:

6.3.1. Be responsible for regulating the composition and quality of fertilizers in terms of:

6.3.1.1. nutrient content;

6.3.1.2. heavy metals linked to the production process and source of raw material;

6.3.1.3. harmful microbes;

6.3.1.4. other dangerous or toxic materials; and

6.3.1.5. additives such as sand, ground rocks and other materials used to dilute the original product.

6.3.2. Set and regulate evidence-based safety standards, limits and guidelines on harmful contents of fertilizer products, taking into consideration the different pathways of contamination and their impacts on humans, animals and soils.

6.4. Specify relevant methods to analyse fertilizer nutrient content and bioavailability for crops in agricultural conditions and ensure the availability and capability of testing facilities for quality control.

6.5. Through their NARS and rural AEAS, supported by international research centres, other research organizations, universities and the fertilizer industry, governments should:

6.5.1. Generate knowledge and provide information to fertilizer producers on the health and safety aspects related to fertilizer composition in order to protect soils, humans, and animals from possible adverse effects of fertilizer use, including impacts on food chains;

6.5.2. Oversee and support the field-testing of fertilizers for their efficacy in providing nutrients to match plant nutrient requirements not met by the soil and/or improve soil fertility;

6.5.3. Conduct appropriate testing of recycled nutrient sources and products intended for use in plant production to ensure they meet appropriate guidelines for nutritive content and quality, as well as safety in terms of limits on contaminants such as heavy metals, harmful microbes, and other dangerous or toxic materials;

6.5.4. Educate stakeholders and fertilizer users on the use of information pertaining to the safety and efficiency, composition, quality, and purity of fertilizers offered for sale, and on means to remain compliant with relevant regulations and guidelines.

6.6. The fertilizer industry, or relevant private entity, should:

6.6.1. Provide governments with all requested information to allow the setting of standards, regulations and guidelines on the composition and testing of fertilizer products;

6.6.2. Develop and adopt own company quality management to support self-regulation by the industry, where appropriate, and subject to legal obligations;

6.6.3. Test sources of products containing reused and recycled nutrients and marketed as fertilizers so that they comply with relevant quality and safety standards;

6.6.4. Ensure fertilizer products comply with government standards and that end-users are supplied with safe and high-quality products that have been tested by recognized standards and comply with appropriate regulations;

6.6.5. Ensure products marketed and sold as fertilizers are effective in providing nutrients for plant production purposes, based on scientific evidence;

6.6.6. Only market fertilizer additives for which scientific evidence supports human health and safety, enhanced crop response, nutrient use efficiency, soil health or environmental quality;

6.6.7. Verify the quality and purity of fertilizers offered for public sale.

6.7. Fertilizer users should:

6.7.1. Purchase or apply fertilizers that have evidence of appropriate and proper testing for composition, quality, and purity;

6.7.2. Follow appropriate guidelines and regulations, as well as application and cumulative application limits for nutrients and maximum allowable concentrations for contaminants;

6.7.3. Inform the relevant authorities when suspecting an issue with a fertilizer product.

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Article 7. Access, distribution and labelling

7.1. Governments should:

7.1.1. Have the overall responsibility for facilitating the access and availability, and regulating the distribution and use of fertilizers in their countries and should ensure the allocation of adequate resources for this mandate;

7.1.2. Implement a fertilizer policy, quality control, and registration system when appropriate, which includes penalties for non-compliance when deemed necessary and wherever possible. Governments are encouraged to harmonize policies at the global level, particularly in relation to quality assurance methods;

7.1.3. Ensure specific quality control during fertilizer distribution, especially related to import/export and regional distribution, to ensure supply chain integrity, specifically that the product loaded and the product delivered are the same and adhere to the specifications provided on the packaging labels;

7.1.4. Ensure locally or regionally relevant and recognized training relating to the retail sale of fertilizers, so as to ensure that those involved are capable of providing end-users with sound advice on fertilizer use and management and on the environmental and health risks associated with the misuse of fertilizers;

7.1.5. Develop, and maintain transportation infrastructure to improve access and reduce logistical costs associated with fertilizer trade and distribution;

7.1.6. Ensure that the proposed use, label claims and directions, packages, safety data sheets, technical literature, and advertising of products sold as fertilizers is based on scientific evidence and are understandable to final users;

7.1.7. Ensure products sold as fertilizers are clearly, legibly and accurately labelled and are understandable to final users in local/applicable languages. Governments are encouraged to harmonize labelling requirements at the global level. At minimum, labels should include:

7.1.7.1. net weight of the product;

7.1.7.2. information on the fertilizer grade/content of plant available nutrients;

7.1.7.3. information on the content of contaminants as required by national regulations;

7.1.7.4. potential environmental and health impacts;

7.1.7.5. release date of the lot or batch of fertilizer and expiry date, if appropriate;

7.1.7.6. relevant information on the storage, safe handling and necessary safety precautions;

7.1.7.7. information, or where to find information, on recommended rates, time of application and placement of fertilizers.

7.2. The fertilizer industry should:

7.2.1. Ensure that persons involved in the sale of fertilizers along the fertilizer value chain are trained

adequately to be capable of providing relevant information to the related actors in the supply chain, including relevant safety information, advice on risk reduction, and information on the responsible and efficient use of the fertilizer products;

7.2.2. Ensure that persons involved in the sale of fertilizers to users are trained adequately and are capable of providing sound advice on the use of the fertilizer products they are selling, and on the environmental and health risks associated with the misuse of fertilizers;

7.2.3. Ensure that technical literature provides sufficient information on adequate practices for different contexts consistent with nutrient stewardship, including the observance of right rate, right source, right placement, and right timing;

7.2.4. Provide fertilizers in a range of pack sizes consistent with national, sub-regional or regional requirements, and appropriate for the needs of small-scale farmers, households and other local users, in order to reduce costs as well as any environmental risks associated with misuse or inappropriate storage, and to discourage sellers from repackaging products in unlabelled or inappropriate containers;

7.2.5. Clearly, legibly and accurately label fertilizers in line with Article 7.1.7, according to relevant regulations/guidelines on good labelling practices, and consistent with regulations/guidelines of the relevant authorities in the country of sale;

7.2.6. Ensure that advertising materials, statements and promotional activities:

7.2.6.1. are technically justifiable and ethically correct;

7.2.6.2. do not encourage the use of the fertilizers for uses other than those specified on the approved label;

7.2.6.3. do not contain recommendations other than/or varying from any existing applicable regulations;

7.2.6.4. make no guarantees or imply results unless explicit evidence to authenticate such claims are available;

7.2.6.5. do not include any inappropriate incentives or gifts to encourage the purchase of fertilizers.

7.3. Fertilizer users should:

7.3.1. When and where possible, obtain fertilizers from officially recognized dealers and that are properly and clearly labelled;

7.3.2. Follow appropriate guidelines and instructions regarding the safe handling and use of fertilizers according to the labelling and other technical materials and advice from suitably recognized and qualified individuals providing the product;

7.3.3. Recycle and/or dispose of fertilizer containers as and where appropriate;

7.3.4. Contact the relevant authorities when the quality of the product does not correspond to the claims made on the label, or when they experience issues with the product.

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Article 8.
Information, extension and outreach

8.1. Governments should:

8.1.1. Encourage and support collaboration and coordination between all relevant stakeholders to provide education programmes, technology development and technology transfer as needed within a country adequately servicing all areas, that is, without creating underserved areas;

8.1.2. Provide support for extension/outreach activities for farmers, to provide advice and assistance in the responsible use of fertilizers and other sources of plant nutrients;

8.1.3. Provide government funded research, extension and outreach programmes to meet needs not covered by NARS, NGOs, farmer cooperatives and organizations, and universities;

8.1.4. Facilitate the adoption, co-creation or importation of technologies that will enhance soil fertility, farm productivity and quality, improve fertilizer use efficiency, and minimize off-site impacts of fertilizers including environmental impacts caused by runoff, leaching and gaseous emissions;

8.1.5. Promulgate and control appropriate safety regulations for the production, distribution, storage, handling, transport, and application of fertilizers;

8.1.6. Use science-based regulations and guidelines to regulate new technologies (that will enhance soil fertility, farm productivity and product quality, improve fertilizer use efficiency, and/or minimize off-site impacts of fertilizers);

8.1.7. Collaborate with all relevant stakeholders to facilitate the use of appropriate machinery and technology to support the enhancement of soil fertility, improvement of fertilizer use efficiency, and/or the minimizing of off-site impacts of fertilizers;

8.1.8. Governments whose programmes for regulating fertilizers are well developed should, to the extent possible, provide technical assistance, including training, to other countries in developing their infrastructure and capacity to manage fertilizers throughout their life-cycle;

8.1.9. Ensure that all analytical laboratories doing soil and plant or crop testing and analysis have proper quality controls to ensure that they provide reliable results in a timely manner;

8.1.10 Advocate for a proper control and enforcement body that controls the fertilizer industry and fertilizer users regarding the rules and legislation on fertilizers that is in force in the territory of their jurisdiction.

8.2. The fertilizer industry, in collaboration with governments and other relevant stakeholders, should:

8.2.1. Provide education programmes and technology transfer as needed within a country without creating underserved areas;

8.2.2. Share relevant information and data to facilitate the delivery of complete and objective education programmes that promote fertilizer best management practices that

maximize the efficient use of plant nutrients while minimizing off-site environmental effects;

8.2.3. Voluntarily take corrective actions when problems occur with fertilizers, and when requested by governments, help find solutions to difficulties;

8.2.4. Develop and facilitate the use of appropriate machinery and technology to support the enhancement of soil fertility, improvement of fertilizer use efficiency, and/or the minimization off-site impacts of fertilizers.

8.3. AEAS and outreach providers (NARS, NGOs and farmer cooperatives and organizations) should:

8.3.1. Commit to continual professional development to remain current on technological advances and innovation processes that encourage co-creation and sharing of knowledge aiming to maximize the impact of educational and research efforts;

8.3.2. Collaborate with governments and other stakeholders to provide educational programmes on adherence to safety regulations for the storage, handling, transport, and application of fertilizers at the local level, compliance with national legislation as regards children's involvement, and work toward identifying and solving safety issues which regulations are yet to address;

8.3.3. Collaborate with governments and the fertilizer industry to provide education programmes and technology transfer as needed within a country without duplication of efforts or creating underserved areas;

8.3.4. Seek out collaborations with other disciplines such as economics, engineering, sociology, plant breeding, plant pathology and other relevant areas to identify and overcome barriers to the responsible use of fertilizers and the adoption of practices that maximize the efficient use of plant nutrients while minimizing off-site environmental effects;

8.3.5. Work with governments and the fertilizer industry to take corrective actions when problems occur with fertilizers at any stage of the fertilizer life-cycle, and when requested, help find solutions to challenges.

Article 9.
Implementation, dissemination, use and evaluation

9.1. FAO and all other relevant international organizations should give their full support to implementing this Fertilizer Code and any related materials.

9.2. To ensure the accessibility and availability of the Fertilizer Code and any relevant supporting materials, it is made available on the FAO website in the six official languages of the UN, and translated into other languages as required.

9.3. This document should be made available and brought to the attention of all stakeholders referred to within; governments, the private sector, actors in the fertilizer supply chain, actors in the nutrient recycling industry, supporting academic and research institutions, analytical laboratories, AEAS, farmer organizations and end-users.

9.4. Governments are encouraged to implement the Fertilizer Code within their countries and promote its objectives regarding the sustainable and responsible use and management of fertilizers for agriculture and other plant production purposes in order to avoid negative impacts on human, animal and soil health and the environment.

9.5. The stakeholders addressed in this document, and all others dealing directly or indirectly with fertilizers, should understand their responsibility in adhering to and promoting its objectives.

9.6. Governments and policy makers should consider the Fertilizer Code when drafting regulations, laws, policies or other instruments related to fertilizers used for agriculture and other plant production purposes.

9.7. Governments and other entities addressed by this document, with the assistance of FAO, are encouraged to monitor progress on its observance and report relevant information to FAO within 4 years of the launch of the Fertilizer Code, if applicable.

9.8. The International Code of Conduct for the Sustainable Use and Management of Fertilizers is a living document and should be reviewed and revised regularly. Any changes to the Fertilizer Code due to new information or developments related to fertilizers and their impacts will be made by FAO through consultation with relevant technical experts and approval of the appropriate FAO governing bodies. Any changes and their implications will be communicated to all the entities addressed by this Code. FAO and all other relevant international organizations should give their full support to implementing the Fertilizer Code and any related materials.

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The Global Soil Partnership (GSP) was established in 2012 as a globally recognized mechanism for positioning soils in the Global Agenda through collective action. Our key objectives are to promote Sustainable Soil Management (SSM) and improve soil governance to guarantee healthy and productive soils, and support the provision of essential ecosystem services towards food security and improved nutrition, climate change adaptation and mitigation, and sustainable development.

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