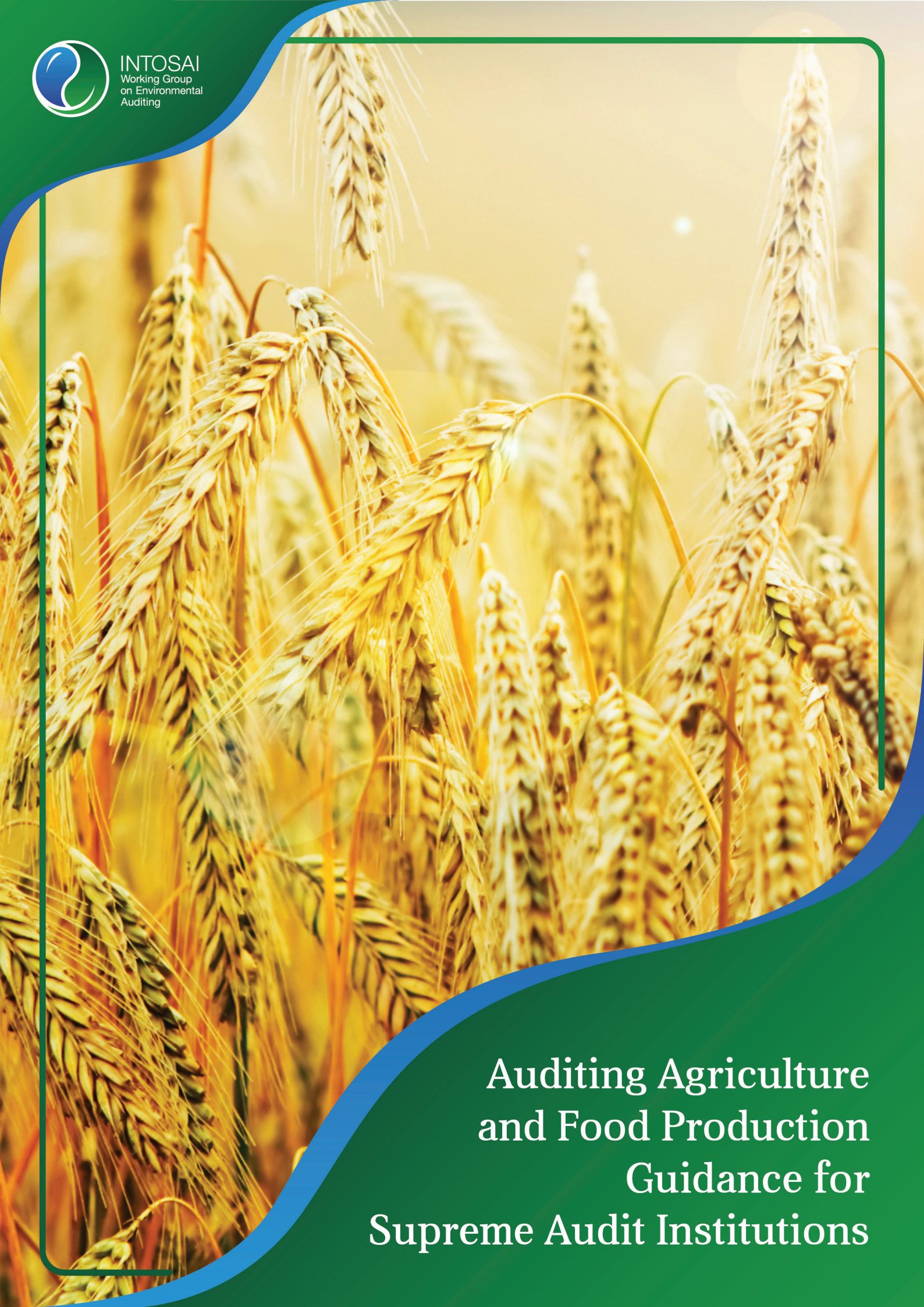





INTOSAI
Working Group
on Environmental
Auditing



Auditing Agriculture and Food Production Guidance for Supreme Audit Institutions



This publication was prepared by the INTOSAI Working Group on Environmental Auditing (WGEA). The WGEA aims to encourage the use of audit mandates and audit methods in the field of environmental protection and sustainable development by Supreme Audit Institutions (SAIs). The WGEA has the mandate to

- help SAIs gain a better understanding of the specific environmental auditing issues,
- facilitate exchange of information and experiences among SAIs, and
- publish guidelines and other informative material.

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Foreword

This guidance on Auditing Agriculture and Food Production was prepared by the INTOSAI Working Group on Environmental Auditing (WGEA) under its remit to provide guidance materials and conduct research studies on emerging topics in environmental auditing to help Supreme Audit Institutions (SAIs) design and carry out environmental audit work.


The selection of the topic of agriculture and food production was confirmed by the INTOSAI WGEA Work Plan 2017-2019. The project has aimed to

- Provide information on status, recent development and prospects on agriculture and food production;
- Highlight the role of governments in managing agriculture and food production
- Provide audit steps and methods to perform agriculture and food production audit and;
- Identify best government practices and audit case studies based on the reports submitted to WGEA Database.

The development project has been conducted under INTOSAI WGEA 2017–2019 work plan and approved by the Steering Committee. The work to develop this paper was led by the AFROSAI WGEA Secretariat, led and hosted by SAI Cameroon in cooperation with project sub-committee members from Botswana, Chad, China, Ecuador, Malaysia, Niger, Togo, and the USA. We thank the sub-committee members for contributing with review and especially for contributions relating to trends in agriculture, the value chain of the sector, and methodological tools, submitted by SAIs of Botswana, Ecuador, and USA respectively.

We would like to acknowledge the contribution made by the sub-committee as well as INTOSAI WGEA and the members of Steering Committee and SAIs worldwide, providing cases to illustrate auditing of agriculture and food production in practice.

A special thanks go to Mrs. Camilla Fredriksen for leading the work in developing, editing and finalising the guidance, together with the team from the AFROSAI WGEA Secretariat in SAI Cameroon, consisting of Mr. Hassan (Coordinator of AFROSAI Secretariat), Mr. Valentine Onya, Mr. Ignace Asina, Mr. Paul Aken, Mrs. Jeanninne Messi and Mrs. Atikatou.



Prof. Dr. Moermahadi Soerja Djanegara, CA., CPA.
Chairman of the Audit Board of the Republic of
Indonesia
Chair of INTOSAI WGEA



Mbah Acha Rose Fomundam
Minister Delegate at the Presidency in Charge of
Supreme State Audit Office of Cameroon
Project Leader



INTOSAI

Goal Chairs
Collaboration
PSC – CBC – KSC

**Quality Assurance Certificate of the
Chair of INTOSAI Working Group on Environmental Auditing (WGEA)**

This is to certify that ***Auditing Agriculture and Food Production Guidance for Supreme Audit Institutions*** which is placed at level three of Quality Assurance as defined in the paper on “Quality Assurance on Public Goods developed outside Due Process” approved by INTOSAI Governing Board in November 2017 has been developed by following the Quality Assurance processes as detailed below:

- i. The project proposal was developed by the team with consultation of INTOSAI WGEA Steering Committee Members;
- ii. The project was discussed during the 15th INTOSAI WGEA Steering Committee Meeting at Washington D.C- USA. in 2017 and further discussed during parallel session of 18th INTOSAI WGEA Assembly Meeting in Bandung-Indonesia;
- iii. The project output draft was circulated among team members, steering committee members, and has gone through more than 30-day exposure (from 22 March to 10 May 2019) for comments at INTOSAI WGEA website and circulated among WGEA members.

The product developed is consistent with relevant INTOSAI Principles and Standards. The structure of the product is in line with the drafting convention of non-IFPP documents.

The product is valid until 30 September 2029 and if it is not reviewed and updated by 30 September 2029, it will cease to be a public good of INTOSAI developed outside the Due Process.

Jakarta, July 2019

Prof. Dr. Moermahadi Soerja Djanegara, CA.CPA
Chair of the Audit Board of the Republic of Indonesia
Chair of INTOSAI WGEA

Quality Assurance Certificate

Chair of the Goal 3: Knowledge Sharing and Knowledge Services Committee

Based on the assurance provided by the Chair of the **Working Group on Environmental Auditing** and the assessment by the Goal Chair, it is certified that the **Auditing Agriculture and Food Production Guidance for Supreme Audit Institutions** which is placed at level **3(three)** of Quality Assurance as defined in the paper on "Quality Assurance on Public goods developed outside Due Process" approved by the INTOSAI Governing Board in November 2017, has been developed by following the Quality Assurance process as detailed in the Quality Assurance Certificate given by the Working Group Chair.

The product is valid till **30th September 2029** and, if not reviewed and updated by **30th September 2029** it will cease to be a public good of INTOSAI developed outside the Due Process.


Rajiv Mehrishi
Chair of INTOSAI Knowledge Sharing and
Knowledge Services Committee

Table of Contents

Foreword	3
List of Figures	7
Executive Summary	10
Introduction	12
Chapter 1 Sustainable agriculture and food production	14
What is sustainable agriculture?	14
What are the common types of agriculture?	15
Trends, challenges and prospects for agriculture and food production	17
How can a country feed its population well?	18
Nutrition	18
Food safety	19
Prospects for agriculture and food production in the age of Sustainable Development	19
Agriculture and Food Production in a resource management perspective	21
Drivers in relation to agriculture and food production	23
Pressures in relation to food and agriculture	25

Altered states of environment due to agriculture activities and food production	26
Impacts of agricultural activities and food production	28
Chapter 2 Choosing and designing audits of agriculture and food production	31
Step 1. Understanding the agriculture and food production sector	31
Geography	32
Macro-economy	34
Demography	34
Step 2. Mapping of the governance of agriculture and food production and identification of stakeholders	37
What are the key instruments to ensure food security and sustainable agriculture?	38
Who are the key players in the agriculture sector?	40
Step 3 Selecting audit topics and priorities through risk analysis	41
Improve agricultural productivity and contribute to rural development	43
Selecting the audit approach and topic	45
Step 4. Designing the audit	47
Chapter 3 Audit experiences, good practices and methodology	50
Auditing food security	50
Auditing Food Safety Systems	52
Auditing Food production and SDGs	55
Auditing agricultural development programmes	55
SAIs auditing external funding by agricultural development	58
Auditing the environmental impact of agricultural activities	59
Bibliography	65
Appendix 1	68
Appendix 2	83

List of Figures

Figure 1. Types of agriculture

Figure 2. Agricultural regions according to geographer Derwent Whittlesey.

Figure 3. Selected synergies & conflicts among agricultural sector

Figure 4. Drivers, pressures, states and impacts in the agriculture sector.

Figure 5. Population growth towards 2050 globally and per continent in billions.

Figure 6. Share of land area used for agriculture, 2014

Figure 7. Trends in CO₂ emissions in Gigagrams 2001-2030 according to agricultural activities

Figure 8. Main Crops base on agro-ecological zones

Figure 9. Map of crops in Cameroon

Figure 10. African agriculture

Figure 11. Production chain

Figure 12. Secure and improved agricultural production

Figure 13. Ensure food security and in some cases self-sufficiency

Figure 14. Protection of natural resources affected

Figure 15. Mitigation and adaption to climate changes

Figure 16. Contribution to socio-economic development and rural development

Figure 17. Food Safety and Control and in the production and distribution chain

Figure 18. Governance issues that could be considered in the audits

Figure 19. Design Matrix for Audit of the government's efforts to ensure rural development

Figure 20. Design Matrix for Two Objectives in GAO's 2018 Report, FOOD SAFETY AND NUTRITION: FDA Can Build on Existing Efforts to Measure Progress and Implement Key Activities a

Figure 21. The process of preparing and conducting a vignette survey

Figure 22. Findings Matrix for GAO's 2016 Report "BEE HEALTH: USDA and EPA Should Take Additional Actions to Address Threats to Bee Populations"

Abbreviations

FAO – Food and Agriculture Organization of the United Nations

GDP – Gross Domestic Product

GHG – Greenhouse Gas Emissions

ILO – International Labour Organization

SAI – Supreme Audit Institution

SDG – Sustainable Development Goal

TFP - Total-factor productivity

UN – United Nations

UNICEF - United Nations Children’s Fund

WFP – World Food Program

WHO – World Health Organization

Executive Summary

Sustainable agriculture is the foundation for supporting the global development goals. A sustainable agricultural development should manage and conserve the natural resource base while meeting the current and future needs of the global population. Yet, the growing population puts additional pressures on our natural resources, because of the need to produce more food. The model of drivers, pressures, states, impact and response illustrates how global phenomena such as population growth, urbanization and industrialization through changed patterns of consumption as well as increased consumption leads to land use change, water degradation and soil erosion, and through unsustainable practices can have severe impacts on biodiversity, ecosystems, as well as increase greenhouse gas emissions.

There is a need for governments to globally and nationally come up with solutions to respond to these trends, and to ensure sustainable food security to its population. National management of food production should be aimed to ensure availability, access and utilization of nutritious and safe food. On a global level 193 countries have adopted the United Nation's Agenda 2030, where one of the 17 goals is to end hunger and promote sustainable agriculture.

To able to do this well governments need to understand and adapt agricultural policy and measures according to country characteristics such as climate, geography, macro-economy and demography, as well as making sure the policies respond to the specificities of the value chain of food production.

SAIs can audit these policies by following the same logic chain, understanding the context and foundations for agriculture and food production in the country, as a first step. Following the four-step approach, understanding the drivers and threats of the agricultural sector, and in the next step mapping the government approach, they will be able to assess the risks related to the government response and implementation of policies, and thus select and prioritise audit topics relevant for their respective countries. A solid selection of topic will be the SAI's starting point for designing the audit, in order to assess Economy, Efficiency and Effectiveness of agricultural policies.

There are several possible ways for government to govern food production and agriculture. Analysis show that SAI audit experiences reveal several types of interventions and programme, intended to ensure food security and agricultural development. Enabling food security for a country requires comprehensive and appropriate plans, and solid implementation schemes. Food that is safe requires comprehensive control systems which are effective and based on risk. If the government intends to develop the agricultural

sector and improve livelihood, the necessity of relevant and well-defined programmes will be key, if not the new activities will not be sustainable in the long run, and resources will be wasted. All these issues could be entry points for auditing the agriculture sector and food production.

In addition, SAI could assess the degree of coordination between agriculture and other sectors, one of the preconditions for successfully implementing Sustainable Development Goals, including the Sustainable Development Goal 2, to end hunger. Cross-sector coordination and impact on other sectors, is also a key point if a SAI wants to audit the environmental impact of agricultural activities. Effects of chemicals used in agriculture, such as fertilizers, could have devastating effects on soil and water, and even health of humans, animals and ecosystems. Uncovering these risks, and assessing government's efforts to address these issues, is another approach to auditing whether national efforts are contributing to sustainable agriculture and food production.

Introduction

The 2030 Agenda for the Sustainable Development sets a global goal for providing sufficient nutrition for all through the SDG Goal 2 Zero hunger. This goal is accompanied by several other goals in the agenda, which cover sustainable and safe production and consumption, all prerequisites for reaching the goal.

A key message of the United Nations Food and Agriculture Organization (FAO) is that there is a need to transform current food systems to make them more sustainable, through a better management and better techniques in agriculture, livestock, fisheries and forestry. These integral productive systems, which consider the rural economy and the sustainable management of natural resources, could guarantee access to food for a growing population. There are many approaches national governments can take to achieve this.

Ensuring that food is produced through a sustainable and safe production chain means ensuring that efficient management and control system are put in place, that measures to prevent environmental impacts are taken and that government promotes good agricultural or manufacturing practices that are sustainable and also meet the needs of rural populations. Failure to do so can have socio-economic and environmental impacts for the country in question.

In the recent decades the effects of climate change constitute an additional factor that changes the conditions for agriculture through changes in precipitation and temperature, or through severe consequences due to flooding and droughts making food production more difficult. Reducing stress on arable land resources and the risk of deterioration of land and environmental resources is necessary to adapt to this situation. Consequently, government needs to ensure that availability of food for the population also is based on a more resilient agriculture practice.

Supreme Audit Institutions (SAIs) have a crucial role to audit and control the efficient management of public resources to strengthen transparency and accountability in governmental institutions involved in the regulation of agriculture and production. Supreme Audit Institutions have the mandate to audit the government's policies, and to inform the population the way in which public policies are managed.

SAIs can audit achievement of international commitments and fulfilment of national objectives, to verify whether government ensures sufficient, safe and nutritious food for its population, accessible for all, and that food is produced in a sustainable manner; without serious impacts for environmental resources.

This guide introduces Supreme Audit Institutions to trends and developments for agriculture and food production globally, as well as environmental impacts of current practices (Chapter 1). It guides the auditor how to approach the sector, and to understand the risks related to governance of agriculture and food production (Chapter 2). Finally, it presents possible approaches to audit agriculture and food production, based on experience of several countries (Chapter 3). The guide also includes an appendix with a selection of audits carried out on the agriculture sector.

The development of this guidance is based on analysis of secondary information obtained outside and inside INTOSAI WGEA community. Firstly, a literature review of a selection of the existing international body of research reports produced by international actors and individual research environment on overall trends and tendencies in the agricultural sector, as well as some individual research studies, has been done to be able to identify trends and prospects affecting the sector, and possible impacts of current practices.

Secondly, responses from the INTOSAI WGEA mini-survey has been used as a starting point to analyse approaches to auditing agriculture by Supreme Audit Institutions. Together with analysis of audit reports reported in the survey or drawn from the INTOSAI WGEA database and case studies submitted, this has led the project to come up with a grouping of possible topics to audit in the area of governance of agriculture and food production.

As far as possible the guidance seeks to refer to sources for presented facts, audit findings and cases. In some cases analysis together with editorial decisions may have comprised direct references, but the bibliography could also help interested readers identify the sources.

All cases, in the appendix 1 has been sent for confirmation with the provider of the case. Finally, the responses from the mini-survey are not attached and will not be disclosed, therefore direct sources are not always referred to when this information is being used in the guidance.

Chapter 1

Sustainable agriculture and food production

The first chapter aims to give the auditor an introduction to global tendencies and phenomena in the agriculture and food production sector. The objective is that the auditor becomes familiar with the overall global development, and understands its connection to in the resource management, public governance and sustainability on national and local level.

In the chapter we present major global and regional phenomena by linking them to the economic and social needs agriculture meet, as well as the environmental threats agriculture activities pose to the environment.

WHAT IS SUSTAINABLE AGRICULTURE?

"Agriculture is the science and production of plants and animals, including fresh water and marine species, for food, fuel, fibre or medicine."

Within this definition lies many different approaches to use and development of natural resources. There is equally a need to know what could be considered to be sustainable agriculture and food production. FAO has defined sustainable agricultural development as "the management and conservation of the natural resource base, and the orientation of technological change in such a manner as to ensure the attainment of continued satisfaction of human needs for present and future generations." (FAO, 1988)."

The FAO report *Building a common vision for sustainable food and agriculture – Principles and approaches* explains five principles behind the concept;

1. Improving efficiency in the use of resources is crucial to sustainable agriculture
2. Sustainability requires direct action to conserve, protect and enhance natural resources
3. Agriculture that fail to protect and improve rural livelihoods, equity and social well-being is unsustainable
4. Enhanced resilience of people, communities and ecosystems is key to sustainable agriculture
5. Sustainable food and agriculture require responsible and effective governance mechanisms

These five principles touch upon several issues which are familiar from the general definition of sustainable development. Resources should be used efficiently, environmental sustainability should be integrated through protection and conservation, it should lead to socio-economic development, and should be viable over time through enhanced resilience. Finally, principle five underlines the need for responsible and effective governance. Governance mechanisms can ensure that the first four principles are upheld, and it can more specifically help steer government and populations toward the purpose of production, food security, and livelihoods for people. For more on principles of sustainable development, please consult the INTOSAI WGEA Audit Guidance on Delivering the 2030 Agenda.

What are the common types of agriculture?

We usually categorise agriculture according to three main types. These classifications relate to the following characteristics

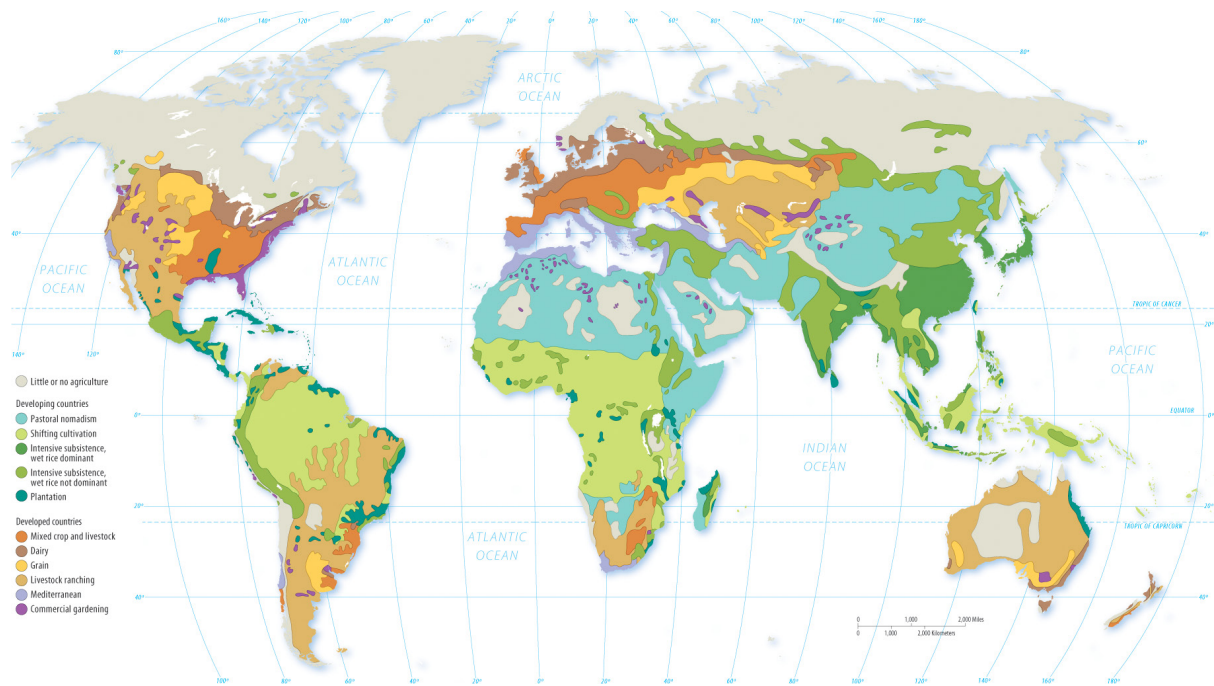
- Types of ownership, tenure and social structures
- Ways of agricultural land utilisation
- Economic factors like agricultural productivity, economic profitability and markets

We also consider the intensity of the techniques. Intensive farming is recognised by an intensive use of land, much manual labour, low use of farm machinery or modern tools and the use of a variety of manures and fertilizers.

Figure 1. Types of agriculture

Type of agriculture	Subsistence farming	Specialised farming	Plantation farming
Purpose and definition	Subsistence farming is also known as shifting cultivation. Farming is carried out to secure food and livelihoods for the family.	Specialised farming can be family based or tenant based. These farms specialise in a particular type of crop or livestock activity, or even aquaculture.	Whether family or company owned commercial farming entail cultivation of plantations.
Land use	Land is often cleared by fires. Cultivated land is usually of small size. 'Field rotation' rather than 'crop rotation' marks this type of agriculture.	Size can vary, depending much on purpose. Free range dairy farming or cattle can demand larger land areas.	Larger areas of land are converted from other types of use, through industrial means.
Techniques	Farming techniques are mostly mechanical. Crop growing is for short periods, followed by long periods of fallowing. Shifting cultivation is usually supplemented by hunting, fishing or gathering fruit. Regional differences when it comes to the intensity.	Specialised farming often allows for more flexibility in techniques. Depending on region, modern techniques can be used. Specialised farming has a heightened focus on crop health and productivity due to high reliance on one produce.	Plantation cultivation is usually characterised by mono-crops, large needs of man powers, and investments. Because of the size of plantations, management of crop productivity and health is often an issue.
Produce	Subsistence farming usually produces starchy foods from the main crops-tapioca, yam, cassava, corn, millet, bananas and rice.	Milk, vegetables, meat,	Rubber, cotton and copra, coffee, tea and cocoa, pineapples and bananas, as well as sugarcane, hemp and jute.

Figure 2. Agricultural regions according to geographer Derwent Whittlesey.



Within these three types of agricultural practices we can identify several sub-types with often has developed due to climatic conditions sub-regionally. The map above shows the different sub-types according to regions, which are listed below;

Pastoral nomadism: The drylands of Southwest Asia & North Africa, Central Asia, and East Asia. (1)

Shifting cultivation: The tropical regions of Latin America, sub-Saharan Africa, and Southeast Asia. (2)

Intensive subsistence, wet rice dominant: The large population concentrations of East Asia and South Asia. (1)

Intensive subsistence crops other than rice dominant: The large population concentrations of East Asia and South Asia, where growing rice is difficult. (2)

Plantation: The tropical and subtropical regions of Latin America, sub-Saharan Africa, South Asia, and Southeast Asia. (3)

Mixed crop and livestock: The U.S. Midwest and central Europe. (2)

Dairying: Near population clusters in the north-eastern United States, south-eastern Canada, and north-western Europe. (2)

Grain: The north-central United States, south-central Canada, and Eastern Europe. (2)

Ranching: The drylands of western North America, south-eastern Latin America, Central Asia, sub-Saharan Africa, and the South Pacific. (2)

Mediterranean: Lands surrounding the Mediterranean Sea, the western United States, the southern tip of Africa, and Chile. (1,2)

Commercial gardening: The south-eastern United States and south-eastern Australia. (3)

TRENDS, CHALLENGES AND PROSPECTS FOR AGRICULTURE AND FOOD PRODUCTION

While agricultural production happens in a local context, demand, production and consumption are driven by global phenomena, affecting conditions of local farmers. Below we present some trends, recognised through international research as major factors in the food production and agriculture sector.

According to the United Nations Food and Agriculture Organisation report on “The Future of Food and Agriculture” (2017), the world’s population is expected to grow to almost 10 billion by 2050, boosting agricultural demand – in a scenario of modest economic growth – by some 50 percent compared to 2013. At the same time income growth in low- and middle-income countries will come with a dietary transition towards higher consumption of meat, fruits and vegetables, relative to that of cereals, changing production patterns, and adding pressure on natural resources.

The projections show that feeding a world population of 9.1 billion people in 2050 would require raising overall food production by some 70 percent between 2007 and 2050. Production in the developing countries would need to almost double. This implies significant increases in the production of several key commodities. Annual cereal production, for instance, would have to grow by almost one billion tonnes, meat production by over 200 million tonnes to a total of 470 million tonnes in 2050, 72 percent of which in the developing countries, up from the 58 percent today.

Feeding a larger population suggest the need for more resources to produce from. Projections to 2050 suggest the emergence of growing scarcities of natural resources for agriculture. Today only 55 percent of the world’s crop calories feed people directly; the rest are fed to livestock (about 36 percent) or turned into biofuels and industrial products (roughly 9 percent). Intensified competition for natural resources could lead to their overexploitation and unsustainable use, degrading the environment and creating a destructive loop whereby resource degradation leads to ever increasing competition for the remaining available resources, triggering further degradation.

The Green Revolution in the 1960s saw an increase in yields (agricultural output)¹ from the agriculture sector which were complemented by the increase in agricultural land, irrigation and agro-chemicals for agricultural production. These gains in agricultural production had negative effects on agricultures’ natural resource base. Land degradation, salinization of irrigated areas and over-extraction of groundwater are some of the impacts that were realized as the world pushed for more agricultural output. Wider environment was also damaged through deforestation and the emission of greenhouse gases and nitrate pollution of water bodies. This trend proved to be unsustainable and could not be continued given its impact on the environment.

The Green Revolution provided a solution to an emerging famine, and improved productivity in farming in South Asia and Latin America. The current projections for population growth suggest a need for increasing food production.

FAO reported that in 2016, 815 million people were considered to go hungry according their definition of regular and sufficient consumption. At the same time 70 percent of the population defined as poor lives in rural areas, a challenge faced especially in South and South East Asia as well as Sub-Saharan Africa where figures are higher. ²

1 Crop yield refers to both the measure of the yield of a crop per unit area of land cultivation, and the seed generation of the plant itself (e.g if three grains are harvested for each grain seeded, the resulting yield is 1:3).

2 The State of Food and Agriculture FAO 2014.

While the growth of yields has slowed to rates, innovation is trying to make up for the natural limitations. Food losses and waste claim a significant proportion of agricultural output. An estimated 25 percent of the world's food calories and up to 50 percent of total food weight are lost or wasted before they can be consumed. In low-income countries food is often lost between the farmer and the market, due to unreliable storage and transportation. Reducing the waste would lessen the need for production increases. However, the needed acceleration in productivity growth will accelerate pressure on land use. For instance, arable land is expanding by some 70 million ha (or less than 5 percent), with the expansion in developing countries by about 120 million ha (or 12 percent) being offset by a decline of some 50 million ha (or 8 percent) in the developed countries. Again, land equipped for irrigation would expand by some 32 million ha (11 percent), while harvested irrigated land would expand by 17 percent.

Finally, changes in climate are also expected to put pressure on natural resources. Rainfall and temperatures are projected to become more variable with climate change, which will lead to a higher incidence of droughts. This will have particularly heavy impacts on rainfed smallholder farming systems in highland areas and in the tropics, which account for 80 percent of the world's cropland and produce about 60 percent of global agricultural output (FAO, 2011b)³.

HOW CAN A COUNTRY FEED ITS POPULATION WELL?

Food production locally or on country-level serves to feed an ever-growing population. When treating the issues of reducing hunger and improving health it can be helpful to be aware of some of the key definitions related to food and human food consumptions.

The World Food Programme (WFP) is a major international actor working to deliver food assistance in emergencies and working with communities to improve nutrition and build resilience. According to WFP people are considered food secure 'when they have the availability and adequate access at all times to sufficient, safe, nutritious food to maintain a healthy and active life'. (source WFP website)

A country's food security status is normally evaluated by considered the following three aspects;

Food availability: Food must be available in sufficient quantities and on a consistent basis. It considers stock and production in a given area and the capacity to bring in food from elsewhere, through trade or aid.

Food access: People must be able to regularly acquire adequate quantities of food, through purchase, home production, barter, gifts, borrowing or food aid.

Food utilization: Consumed food must have a positive nutritional impact on people. It entails cooking, storage and hygiene practices, individuals' health, water and sanitations, feeding and sharing practices within the household.

Nutrition

The third aspect points back to what and how food is being produced and stored. Nutrition and food safety are two distinct areas of agriculture and food production that merits a closer look, to respond to how countries can feed their population well. Good nutrition is a precondition for living and development. Malnutrition relates to various aspects of consumption, including undernutrition, micronutrient deficiencies and obesity – according to FAO these problems exist in all countries and cut across socio-economic classes. Small children and even babies at the antenatal stage are especially vulnerable

³ The Future of Food and Agriculture and Challenges. FAO, 2017

when it comes to undernutrition and nutrient deficiency. Furthermore, newer studies suggest that low birthweight is related to obesity later in life. Stunting describes a consequence of malnutrition seen in children, defined as low height for age. This condition is irreversible. According to studies stunting before the age of two results in poorer cognitive and educational outcomes in later childhood and adolescence.⁴ While statistics from UNICEF and WHO suggest that undernutrition has declined more than 10 percent from 2000 to 2015 (from 32,7 to 23,2 percent) (UNICEF, World Health Organization and World Bank, 2016), numbers from 2018 show that 155 million children under the age of five are stunted.

Food safety

Finally, in addition to providing enough and available nutritious food to the population, countries face the challenge of securing that the food is safe to eat. Estimates from the World Health Organisation (WHO) suggest that 600 million people are affected by foodborne illnesses annually.⁵ For the WHO unsafe food is classified as a threat to human health and economies globally and has been documented to cause more than 200 acute and chronic diseases, the most common being bacteria causing diarrhoea, but also covering Salmonella, Hepatitis A and Aflatoxin. The latter is a toxin that could spread from soil to plant, destroying crops and poisoning consumers eating from the crop. Ensuring food safety is important to the entire production and consumption chain, and producers and distributors need to work together, to eliminate or minimize the risk to health insufficient food safety poses.

PROSPECTS FOR AGRICULTURE AND FOOD PRODUCTION IN THE AGE OF SUSTAINABLE DEVELOPMENT

193 countries have adopted United Nation's Agenda 2030. The Agenda defines 17 goals for achieving sustainable development. Sustainable Development Goal 2 (SDG2) Zero Hunger addresses food security by aiming to end hunger and promote sustainable agriculture. According to the policy document Agenda 2030, countries need to recognize the interconnectedness of the agendas objectives to achieve a sustainable development. Securing enough and safe food for the population is this sense also connected to the following goals on the agenda;

- SDG 3 Good Health and Wellbeing
- SDG 6 Clean Water and Sanitation
- SDG 8 Decent work and Economic Growth
- SDG 12 Responsible Consumption and Production
- SDG 13 Climate Action
- SDG 14 Life below water;
- SDG 15 Life on land

The achievement of the SDG2 depends on whether governments manage to take a cross-sectoral approach, that enables them to integrate and coordinated efforts related to the other 17 goals. This means that implementation of the agenda and the SDG2 will need to need a common platform. Ending hunger and ensuring sustainable agriculture will need to address consumer habits, environmental and resource management, mitigation and adaptation of climate changes, and the need to create jobs and investments in the agricultural sector.

⁴ The Future of Food and Agriculture. Trends and Challenges. FAO 2017.

⁵ The Public Health Burden of Unsafe Foods; a Need for Global Commitment. A.H. Havelaar 2019.

In recent years there is a growing trend towards adoption of conservation agriculture practices that seek to improve efficiency with which inputs are turned into outputs, but also conserve the scarce natural resources base. The key to meet future challenges and sustainable agricultural growth, efficient use of land, labour and other inputs through technological progress, social innovation and new business models are critical. The main objective of conservation agriculture is to reduce soil disturbance by minimizing mechanical tillage, maintain a protective organic cover of the soil surface, and cultivate a wider range of plant species.

There are indications that building resilience to climate change through climate smart agriculture has also contributed to increased total factor productivity in agriculture. For example, the use of agroforestry systems is an important means to produce food while conserving ecosystems; because it allows farmers to produce the food they need but reduce soil erosion and allows for restitution of ecosystems after harvesting.

Development of infrastructure for information and communication technologies play an role in ensuring that farmers and rural entrepreneurs are informed about agricultural innovations on how to increase agricultural production. Face-to-face extension services are being complemented, and sometimes replaced, by mobile phones, the Internet and more conventional media, such as radio, video and television.

There is widespread awareness that the adoption and adaptation of sustainable farming systems and practices, such as conservation agriculture, agroforestry, integrated crop-livestock-energy systems and integrated pest management, require technological innovation and investment in research and development (R&D). However, this awareness and interest must be accompanied by an institutional enabling environment is crucial to ensure the effective implementation of sustainable farming systems and to support their promotion and adoption.

The Sustainable Development Network under the UN have proposed possible solutions to move forward in the agriculture sector. In the report Solutions for a Sustainable Agriculture Development the authors propose three main ways to solving the projected challenges of feeding the growing population without increasing the pressure on natural resources.

1. Reducing food losses and waste and shifting to healthier diets
2. Producing more food through sustainable agricultural intensification
3. Climate-smart agricultural landscapes

FAO estimates that one-third of all food produced is lost or wasted (2011). This means that important nutrients get lost along with food to a value of approximately 940 billion USD annually.⁶ Reducing food loss applies to all steps in the food chain. Crop losses before or in relation to harvest, or crop spoiled on the way to markets, and furthermore spoil during storage or distribution, all lead to food loss, together with the enormous amount of food being thrown out by consumers. Addressing these problems, includes disease management in crop, improved food safety and controls by government, as well as enabling infrastructure that improves storage and distribution to reduce the loss. The food loss is also seen to be connected to less variation in diets, due to trends like urbanisation. Therefore it is possible that shifting to plant-based protein and more diverse diets, including focusing on appropriate quantities and quality of choices will lead to a more sustainable production with lesser impacts on resources.⁷

According to Professor James March, intensification is the process of seeking to increase overall output by using a resource that is limiting supply – often simplified to land – more

6 Food wastage footprint & climate change. FAO. 2015.

7 Solutions for Sustainable Agriculture and Food Systems. Doberman et al. SDGN. 2013.

productively.⁸ Economic systems tend to do this autonomously for resources that can be bought in the market. In practice when land or water in agriculture becomes scarce resources, intensification can be to use new technology to increase crop yield without increase the area or the volume of water used.

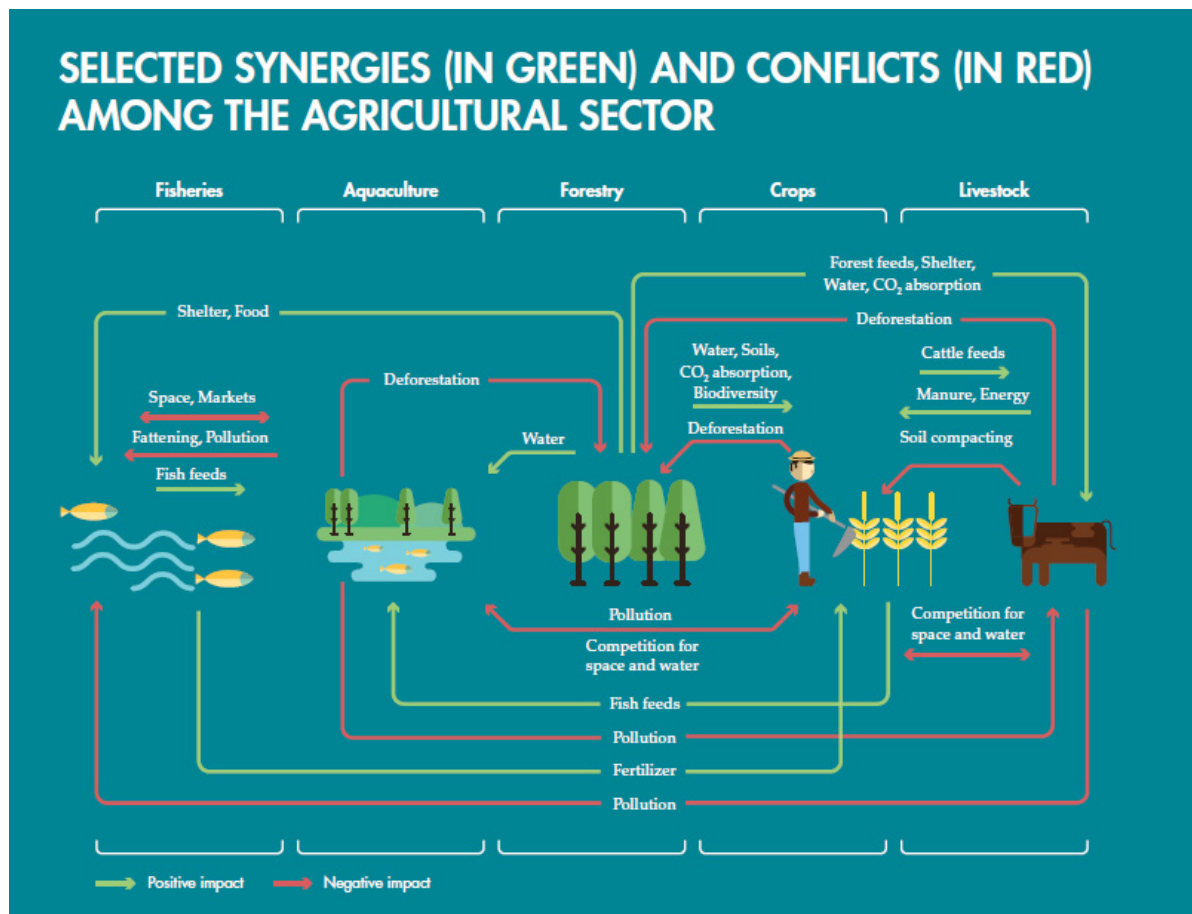
Climate-smart agricultural landscapes relate to adapting systems to reduce greenhouse gas emissions in agricultural practices, but more importantly to increase the resilience of the existing systems, to protect ecosystems and allow for adaptation to climate change impacts, by climate-smart use of landscapes, varying use of land resources according to climates, rainwater harvesting to reduce the need for irrigation, and increased focused on pest and disease management.

In Chapter 2 we will look more at what government is doing to respond to the objective of ending hunger and improving sustainability in agricultural production.

AGRICULTURE AND FOOD PRODUCTION IN A RESOURCE MANAGEMENT PERSPECTIVE

As we have seen there are major factors affecting the conditions for sustainable agriculture, including quality, availability and access to resources. For auditors conducting environmental audits it could be helpful to approach the area from a resource management perspective to better understand the relationship between them, the cause and effects, and what are the risks to sustainability in the sector.

Figure 3. Selected synergies & conflicts among agricultural sector



8 Sustainable Intensification. J. March. World Agriculture Net. 2018.

An ecosystem is a complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit. Ecosystems provide services to animal, plants and humans. For example, a sustainable forest management helps forest to lead water to other ecosystems, and to absorb carbon from the atmosphere mitigating climate change. On the other hand, pollution from chemicals used for crop development can contaminate the water, and pollute the water taken up by the trees, leading to death of trees and in turn to deforestation.

As the illustration above seeks to present, agricultural activities can affect their surroundings. They also rely on ecosystem services to function and produce. We normally talk about four types of ecosystem services;

1. *Provisioning services* are goods and products produced by the ecosystem – usually in an agroecosystem the agricultural activities will provide the goods and product, in addition to the products the systems provide by itself
2. *Regulating services* are natural processes regulated by ecosystems – agricultural activities rely on the regulating services of ecosystems – hereunder water streams, pollination, pest regulation, waste treatment, carbon storage and climate regulation
3. *Cultural services* are intangible services obtained by ecosystems – rural communities develop practices and traditions that heavily relies on the benefits of nature
4. *Habitat services are supporting services* – The provision of living spaces for plants or animals and maintaining a diversity of plants and animals, belong to the “supporting services” that ecosystems provide. They underlie all ecosystems and support their existence and their ability to provide the other services in addition to providing habitats for animals – this also includes soil nutrients cycles – important for the quality of the soil being used for agriculture.

The factors behind and impact of agricultural trends

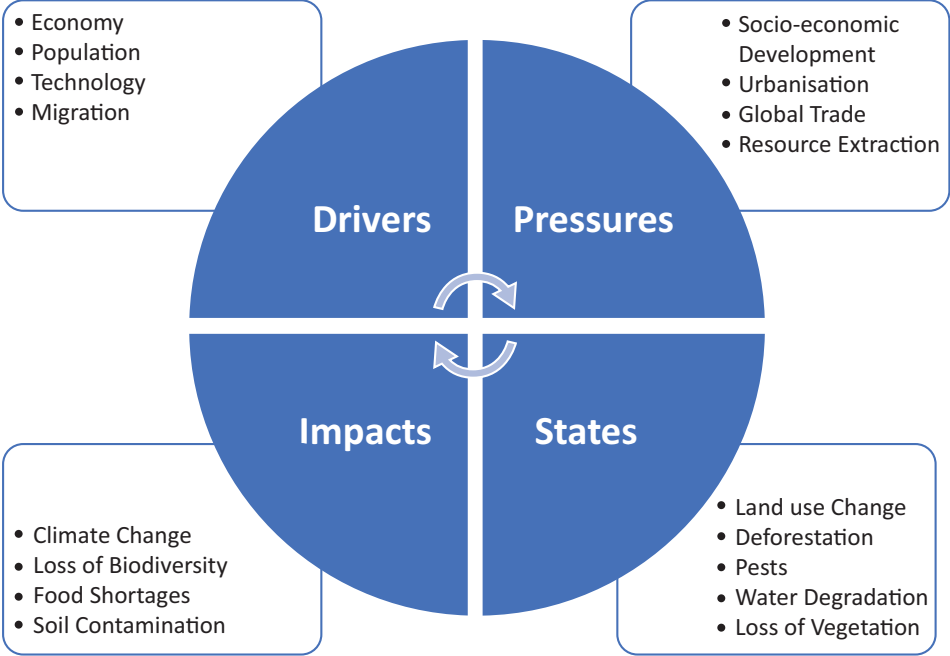
In the next section the DSPR framework will be used as a model to help us better understand what affect agriculture and how development impacts the environment. The abbreviation DPSIR stands for drivers, pressures, states, impacts and responses. The model allows for an integrated approach to analysis of the relationship between human activities and ecosystems, in order to come up with an appropriate response to the problem. The framework groups issues and processes affecting to ecosystems according to drivers, pressures, state and impacts to seek to explain how one the trends observed for the agriculture sector have consequences for people, environment or the resource. The response will be presented partly in Chapter 2, Step 2, under government response.

Meat consumption as an example

With improved economic conditions (drivers) more and more people find themselves moving to the cities (pressures). With urbanisation comes a changed diet, often towards increased meat consumption. This again leads to an orientation towards more livestock farming to meet the needs of the consumer. Meat production typically needs less space than crop farming, but if it because of economic development, where the sector producing more, there is a need for extra land conversion to adapt to this increase in production. Land use change (state) becomes the immediate outcome, while greenhouse gas emission from the meat production is the impact over time, along with health impacts on people, through increases in obesity and non-communicable diseases.

The figure below presents the drivers, pressures, state and impacts, that will be presented. It is important to note that these do not always happen chronologically, but can be observed simultaneously;

Figure 4. Drivers, pressures, states and impacts in the agriculture sector.



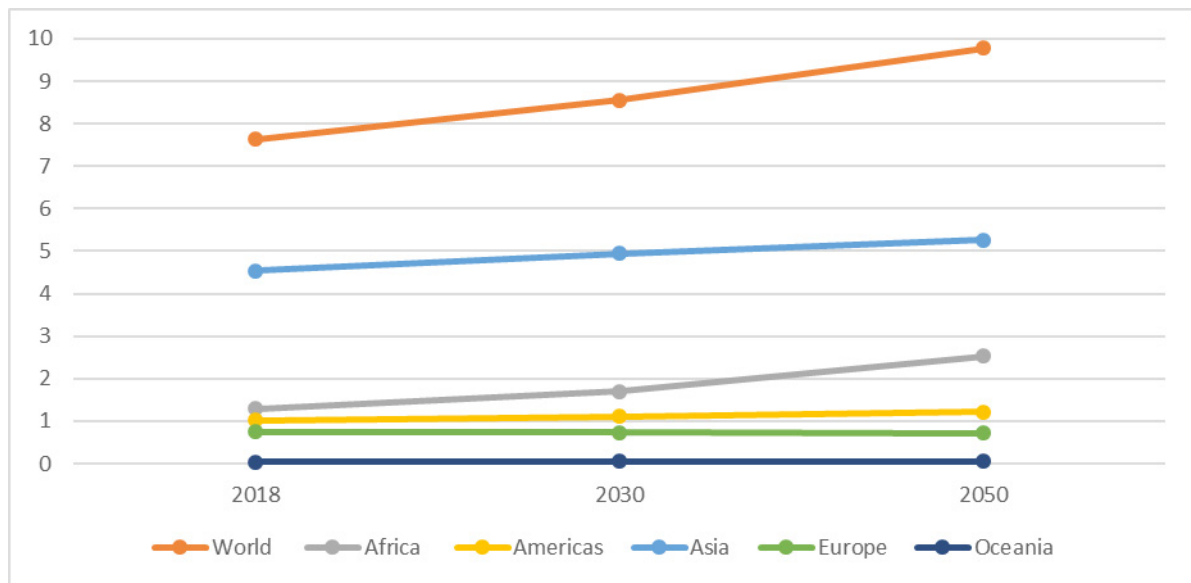
Drivers in relation to agriculture and food production

Drivers are the overarching socio-economic forces that exert pressures on the state of the environment. The challenge for governments today is to find a solution that allows them to feed the population without degrading and reducing natural resources. For government it is necessary to know what forces will drive development in order to plan and implement the appropriate approach. This section introduces the auditors to these drivers and their relation to agriculture and food production.

Population growth

FAO considers population growth and dynamics as key drivers of changes in demand for food and agricultural products. In general, the world population growth is slowing down, but in some regions the population will continue to expand beyond 2050 and even the next century. For example, Sub-Saharan Africa and some parts of Asia are among the top regions with fast growing populations. As the figure below indicates, population numbers in Africa and Asia will increase with one billion people on each of these continents towards 2050, in the case of Africa, doubling the population.

Figure 5. Population growth towards 2050 globally and per continent in billions.



Source - FAOSTAT – statistical database on FAO.ORG

Population growth alters the composition of age, gender and localisation within a country. Population growth is a result of migration, reduced infant mortality, increased fertility and longer life expectancy. In growing populations, younger generations tend to make up an increasing share of the overall population. Between 2015 and 2050, in low –and middle-income countries, the number of people between 15 and 24 years of age is expected to rise from about 1 billion to 1.2 billion. Most of this young people are expected to live in sub-Saharan Africa and South Asia, particularly in rural areas. In these areas, jobs could be difficult to find, and the population increase could lead migration at the national level to urban centres, and to other countries and regions. In other regions longer life expectancy can also lead to an older population, which can have implications for access to labour in the agricultural sector.

Migration

Along with demographic changes migration patterns equally shape population patterns and access to agricultural resources. Migration is usually caused by economic changes or conflicts, but to a larger degree also caused by inability to stay in previously populated due to environmental impacts, such as climate changes causing equally physical hinders and unsafety.

For younger generations the lack of opportunities often leads to migration. According to FAO, arguably the single biggest global development challenge in the decades to come will be the need to integrate hundreds of millions of young people into the labour market. In the absence of decent work opportunities and access to social services and protection, young people aged between 15 and 24 whose population will rise from about 1 billion to 1.2 billion in 2050 will join the flow of internal and international migrants.

Economic growth

Economic developments contribute to changed action patterns, both on global and local level. Economic growth can lead to increased food production and increased investments in the agriculture sector. Macroeconomic stability can be a factor leading to opportunities

for modernisation and upscaling of farming, as well as introduction to new types of agricultural practices. An example is increased productivity through access to better tools. Another could be investment and development of new resources, such as aquaculture. For example, in some Asian countries, fish and rice culture have been practiced for thousands of years, but in some countries, investments in additional activities, such as prawn farming in Bangladesh, have led to a diversification of the agriculture, which in turn have led to more sustainable livelihoods in rural areas.

In the last decade agricultural growth in Africa has accompanied economic growth. For example in 2013, agriculture's direct contribution to GDP in Africa was about 15% and is also reflected in the sector's share of employment and exports.⁹ Some studies suggest that the development could be explained through macroeconomic stability, improved investment climates and economic incentives in the sector.

Technology

According to Fuglie and Wang, the most important driver for sustained productivity growth in agriculture is research and development.¹⁰ Research shows that a country's capacity to develop and disseminate new technologies adapted to the conditions of local farming, have contributed to higher degree of agricultural productivity, measured as total-factor productivity (TFP). Furthermore, Fuglie and Wang argues that sharing of knowledge on agriculture internationally and bilaterally are important measures for securing productivity growth, but that adaptation of the results to local farming systems are key to achieve growth. However, technology development needs to be accompanied by an enabling environment, that is dissemination of the technology, and government response in form of policies such as economic incentives, education and infrastructure. Inversely other issues that will be presented under states and impacts, such as diseases and conflict, can hamper and reduce the growth.

Pressures in relation to food and agriculture

Drivers in turn produce "pressures" on the environment, essentially stresses resulting from human activity. We will now present some of the most common pressures.

Urbanisation

The urban-rural balance has significantly changed, and more than half of the global population now reside in urban areas. Projections indicate that by 2050, more than two-thirds of all people may be living in rural areas. Urbanisation brings about transition in dietary patterns and shift in employment within the foods systems with fewer people now working in the agricultural sector¹¹.

Urbanisation also have major implications in the composition of the rural labour force, patterns of agricultural production, land tenure, social organisation and socio-economic development in general. The younger, healthier and better educated farmers migrate to urban areas leaving the older farmers at a disadvantage. Agricultural innovations, such as the diffusion of new agricultural technologies and the introduction of improved seeds and tools, often bypass older farmers, as many have neither the financial resources to buy additional inputs, nor the skills (e.g. literacy) nor energy to invest in adopting new practices.

Based on current trends, if these regions were to rely exclusively on domestic production for their food supply, prospects to continue to supply could be seriously jeopardized. This holds particularly true for those agriculture dependent countries with limited land and water resources.

⁹ Revival of Agricultural Productivity in Africa: Hoping for Better Food Security. Doukkali and Gedegbe 2017.

¹⁰ Productivity Growth in Global Agriculture - Shifting to Developing Countries Choices. Keith Fuglie and Sun Ling Wang 2012.

¹¹ The Future of Food and Agriculture and Challenges FAO 2017.

Socio-economic development

According to World Bank, growth in the agriculture sector is two to four times more effective in raising incomes among the poorest.¹² In 2014 agriculture accounted for one-third of global gross-domestic product (GDP). In 2016 65 percent of poor working adult depended on agriculture to make a living. Transition out of poverty therefore relies on raising productivity in the agricultural sector. In many regions it is still the main source of employment. Research also suggest that in parts of Sub-Saharan Africa where agricultural productivity has slow growth, also other sectors tend to have slow growth.

Resource extraction

Nature provides ecosystem services to humans, animals and plants. An increase in resource extraction, such as mining or oil extraction entails interventions in ecosystems that could alter the balance and lead to degradation. Extractive industries usually need to use water in their processes and the extraction processes equally affect soil through turning over of soil. Increased extractive activities disturbs the natural balance of the ecosystem and put ecosystem services at risk. For agriculture it can lead to contamination of ground water and soil, making agriculture impossible.

Altered states of environment due to agriculture activities and food production

We refer to state when explaining how the pressures in turn affect the condition of resources and environment. Altered states are often the first observations of that which consequently impacts human well-being and ecosystems. Usually they are negative, but they could also be positive.

Land use change

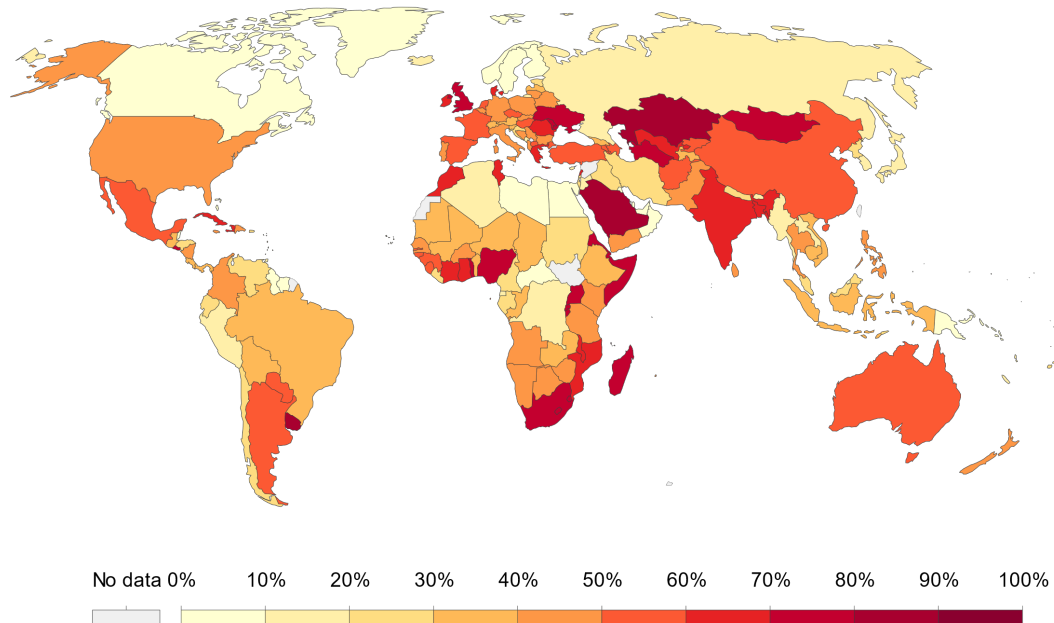
Agriculture is the world' biggest user of land, covering over one-third of Earth's terrestrial surface. Land use change is closely connected to the other pressures mentioned above. Construction and urban development naturally suppress areas formerly habituated by natural ecosystems. Agricultural expansion can lead to land use change when plantations are expanded, and natural habitat is displaced, because plantation farming doesn't support the existing biotopes. Land use change create a pressure on existing resources, without necessarily presenting mitigation efforts. The figure below shows the percentage of total land area of countries are used for agriculture. In turn, pressures from agriculture affect conservation of other ecosystems.

¹² Ending Poverty and Hunger by 2030. World Bank 2015.

Figure 6. Share of land area used for agriculture, 2014

Share of land area used for agriculture, 2014

The share of land area used for agriculture, measured as a percentage of total land area. Agricultural land refers to the share of land area that is arable, under permanent crops, and under permanent pastures.



Source: World Bank

OurWorldInData.org/yields-and-land-use-in-agriculture/ • CC BY

Deforestation

Forests ecosystems regulate the amount of water available and the timing of water delivery. Stream-flow regulation by forests is the result of processes in the forest canopy, on the surface and below the ground – a combination of interception, transpiration, evaporation, evapotranspiration and infiltration. Accordingly, sustainable forest management is key to the regulation of water flows.

Agriculture is estimated to be the driver for around 80 percent of deforestation worldwide. Land degradation is accelerated by clearing the land of forests making the competition for natural resources more acute among different users. The expansion of commercial farms into forestland deprives forest communities of plant and animal diversity that is often critical to their food security. The loss of forest biodiversity also has repercussions for global food security, as it reduces options for breeding new crops and plant varieties that may allow food systems to better adapt to climate change. Deforestation also is a major source of GHG emissions. The growing trend of urbanisation and changing patterns driven by population growth, greater prosperity and climate change are expected to put more pressure clear more forests for agricultural purposes in the future (FAO).

Water degradation

Irrigation represents the main use of water in agriculture and one of the main uses of water resources in general. Water use in agriculture usually make up 50 percent of a country's water use.¹³ Trends in water abstraction may depend on several factors, such as crop type, irrigation technology, water prices, and climatic conditions.

Water withdrawal and over-extraction through agricultural production poses a serious threat to water quality and quantity, and water access to population. In arid and semi-

¹³ Drivers of change in global agriculture Peter Hazell and Stanley Wood (2008).

arid regions water quantities can be volatile, and this poses a risk to also to crops that depend on irrigation. Lower water means lower yields but also reduces the stream and flow, potentially leading to soil contamination. Water scarcity put pressures on major river basins and natural aquifers.

It's worth to note that water stress from agriculture, isn't only a negative state because of the implication on other resources, but will most likely affect agriculture itself, mainly by unsuccessful food crops, and a reduction of food harvested and possible undernourishment, but also in the case of livestock farming were lack of water, and production of crops for fodder for livestock, may lead to hunger and consequently slaughter of animals that would normally would be part of a sustained livestock farm, producing milk, meat or other animal products.

Furthermore, the impacts leading from water degradation can be serious. Irrigation systems can have indirect impact on the environment, such a waterlogging, soil salination, ecological damage as well as socioeconomic damage. Waterlogging is a state where the soil becomes oversaturated with water, damaging plant roots reactor to chemicals in the soil. In using an irrigation system, water is drawn from an area, and the loss of water leads to a soil with concentrated salt levels in the water left behind, creating difficulties for plants to absorb nutrients and water from the soil.

Other impacts are reduced downstream flow, changing river ecosystems, in addition to reduced water supply. This can also affect coastal ecosystems. Finally, the effects of irrigation threaten marine population and thus may affect communities relying on fishing, affecting diets and economy.

Impacts of agricultural activities and food production

Finally, in this model we turn to the impacts of agricultural activities. The altered state will in turn have an impact affecting human and ecosystem. Impacts refers to the seriousness of what is seen and indicates the requirement response to reverse or slow down the phenomenon.

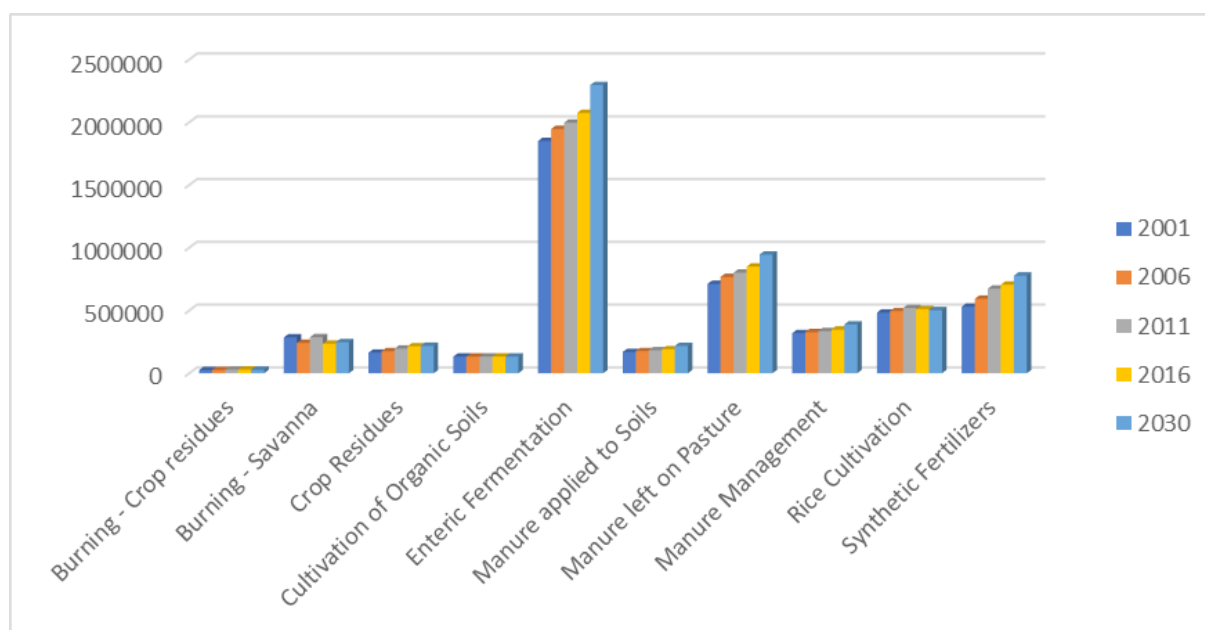
Land conflict

Although agriculture at the global level has become more efficient, in recent decades, competition for natural resources has intensified owing to consumption patterns driven mainly by population growth, changing dietary patterns, urbanization and climate change. Land degradation, deforestation and water scarcities are among the most visible manifestations of this unsustainable competition.

Climate Change

Food and agriculture sectors contribute substantially to greenhouse gas emissions (GHG). Agriculture contributes the largest share of global methane and nitrous oxide emissions. The nitrous oxide emissions originate mainly from the application of nitrogen-based fertilizers and animal manure management. The removal of GHG by forests has fallen from 2.8 Gt annually in the 1990s to an estimated 1.8 Gt in 2014 mainly due to loss of forestland to agriculture. The impacts of climate change are expected to be most adverse in low- and middle-income countries, where millions of people depend on agriculture and are vulnerable to food insecurity.

Figure 7. Trends in CO₂ emissions in Gigagrams 2001-2030 according to agricultural activities



Climate change will affect every aspect of food production. Increasing variability of precipitation and increases in the frequency of droughts and floods are likely to reduce yields in general. Although higher temperatures can improve crop growth, studies have documented that crop yields decline significantly when daytime temperatures exceed a certain crop-specific level (FAO, 2016e). Without efforts to adapt to climate change, food insecurity will likely increase substantially. Climate change’s impact on global food security will relate not just to food supply, but also to food quality, food access and utilization, and the stability of food security. Climate change may affect the nutritional properties of some crops.

Biodiversity loss

Agro-ecosystems rely on many functions of the ecosystem we find naturally. Biodiversity also includes all these components, in specific, animal, plants, micro-organisms, species and the genetic make-up of these. The interaction between the agriculture and the ecosystems that sustains this biodiversity has been an important source development of crop varieties and animal breeds. Land conversion can lead to biodiversity loss because it often introduces invasive species, pest and diseases. Existing animal and plants may not have the coping mechanisms to manage these new elements, and a possible consequence could be that former existing species are reduced or even eradicated and replaced with a different type of species that again changes the characteristics of the ecosystem.¹⁴

Food shortages

Over the past ten years the number of violent conflicts around the world has increased significantly, in countries already facing food insecurity, hitting rural communities the hardest and having a negative impact on food production and availability. In addition, climate change, pests and diseases can impact food production, and create food shortages. Insufficiency in productivity also leads to consistent food shortages. For example many countries in sub-Saharan Africa faces chronic hunger in their population because of their inability to produce enough food compared to the need in the population.

¹⁴ Sustainable Agriculture for Biodiversity – Biodiversity for Sustainable Agriculture (2018) FAO.

Soil contamination

FAO considers land degradation is an impediment to realising food security and reducing hunger. Globally it is reported that 33 percent of the world farmland is moderately to highly degraded. Additional land is also not available for expansion of agricultural area given that the additional land available is not suitable for agriculture.

For further information on soil management, please see the INTOSAI WGEA Guidelines for SAIs on Land Use and Soil Quality Management for Combating Desertification (2019).

Chapter 2

Choosing and designing audits of agriculture and food production

This chapter aims to help SAIs and their auditors in determining and identifying possible topics to audit within the agriculture and food production sector.

In the research and planning stage of auditing a new sector, it can be helpful to apply a systematic approach to enable the audit team to narrow down the many possible lines of inquiry. The 4-step approach has been one methodological planning tool used with success by many SAIs and has been applied by previous INTOSAI WGEA Guidance documents on auditing biodiversity, waste and climate changes, for example. The steps are indicative and can therefore be applied when researching and planning audits on agriculture and food production, considering the specifics of this sector. The approach applies the principles for determining and planning audits that can be found in the ISSAIs. In this guidance we are applying these steps to the context of governance of the agriculture and food production sector.

The four steps in our context are

1. Understanding the agricultural sectors, including drivers and threats
2. Mapping government efforts
3. Prioritising topics and selecting the audit topic through risk analysis
4. Designing the audit

STEP 1. UNDERSTANDING THE AGRICULTURE AND FOOD PRODUCTION SECTOR

The first step for auditors that want to conduct an audit in the agriculture and food production sector is to research and gather appropriate knowledge about the sector. The agriculture sector is complex, and government's decisions in meeting the country's needs could affect other resources.

Either as a part of a focused pre-study or in a more explorative strategic study of the sector, auditors need to start by studying and analysing the situation in the sector. Even where SAIs prioritise audits on compliance of allocation and reporting on agricultural subsidies, it helps auditors to understand which challenges are specific for their country context, and what could be possible contextual reasons for challenges regarding economy or compliance.

Chapter 1 presented global trends and drivers, as well as environmental impacts of agricultural practices. On country level we need to understand the local factors that shape the conditions for agriculture, safe food production and food security, and how they contribute to the issues described in chapter 1. We can start by looking at the country's geography, macro-economy and demography. In the following sections, we are using the country Cameroon as an example to illustrate the information under each of these categories.

Geography

When the objective is to create livelihood for people, job creation in agriculture, and sufficient nourishment for the population – the natural foundations play a role, both in the determining what kind of agriculture to develop, and a country's access to food. The potential of its agricultural sector depends on

- Climate
- Percentage and quality of arable land
- Endemic vegetation
- Size
- Production potential vs need for the population
- Distribution and accessibility

This exercise to identify these factors would also normally include mapping the actual status of the sector including types of farming and actual production. Below relevant information about the conditions for agriculture in Cameroon are presented;

Cameroonian climate is characterised by tropical humidity in the South and dry in the north, with an average temperature of 25°C in the south and 32°C in the north. In the mountainous areas in the west temperatures could be colder according to altitude. Cameroon cover 475 000 km². Often compared to an Africa continent in miniature, the diversity of the country contains a very important agro-ecological potential. The agro-ecological zones with their main production commodities are listed below. The map on the next page shows the distribution of agricultural activities according to regions.

Figure 8. Main Crops base on agro-ecological zones

Agroecological zones	Main Crops
Soudan Sahelian	Cotton, millet, sorghum, beans, onion, sesame.
High Guinean Savannah	Maize, cotton, millet, sorghum, ground nut, yam, potato
Western Highlands	Cocoa, coffee, maize, beans, potato, vegetable gardens
Humid forest with single-mode rainfall	Cocoa, banana, coffee, palm oil, ginger, pepper
Forest with bimodal fall	Cocoa, coffee, cassava, plantain, maize, pineapple, palm oil

Figure 9. Map of crops in Cameroon



Cameroonian agriculture produces 1,1 million agricultural units annually. In regard to farming types

- 72 percent of this production comes from farmers doing a combination of crop and livestock farming
- 25 percent of farmers are specialised in crop agriculture
- 3 percent specialises in livestock

Macro-economy

To better understand the agriculture's role as an economic sector in the country, and the dynamics to provide food security, it's necessary to consider key economic parameters such as;

1. Economic development over time
2. The sector's contribution to GDP, including productivity;
3. Economic growth in rural areas
4. Percentage of population employed in agriculture
5. Food prices, and percentages of wages used for food by the population
6. Food import and export over time and key commodities

Example – Some key data from the agricultural sector in Cameroon

The agricultural sector in Cameroon employs close to 70 percent of the population and represents 40 percent of income from export. The income from the sector makes up 20 percent of the GDP. Production of consumable production from the sector has in the last years declined in favour of other products like cotton.

Demography

Population growth is a driver and demographic patterns such as urbanisation or a large young population affect agricultural practices as well as consumer trends and nutritional needs. Relevant information for auditors who wants to acquaint themselves with this could be statistics on

- Population development trends – including gender and age structures
- Percentage of rural and urban population
- Nutritional status of population
- Development of health parameters

Example – Typology of African agriculture containing elements from both geographic, economic and demographic indicators.

Figure 10. African agriculture

	Rural poor more than half of poor population		
	Agriculture more than 30 percent of total GDP	Agriculture less than 30 percent of total GDP	Rural poor less than half of poor population
More-favorable agroecological conditions			
Coastal	Benin	Côte d'Ivoire	<i>South Africa</i>
	Ghana	Kenya	The Gambia
	Tanzania	<i>Mauritius</i>	
	Togo	Mozambique	
		Senegal	
Landlocked	Burkina Faso	Lesotho	
	Ethiopia	<i>Swaziland</i>	
	Malawi	Uganda	
	Mali	Zimbabwe	
Mineral	Central African Republic	Chad	Angola
		Equatorial Guinea	Cameroon
	Democratic Republic of Congo	Guinea	Republic of Congo
		Zambia	
	Nigeria		
	Sudan		
Less-favorable agroecological conditions			
	Burundi	Eritrea	Botswana
	Niger	Madagascar	Cape Verde
	Rwanda	Mauritania	
	Namibia		

Source: GDP and poverty data from World Bank (2010a, 2010b) Agroecological and geographic classifications from Diao et al. (2007)

Notes: Poverty shares use most recent available survey year and national poverty lines (US\$1 per day). Only countries not rich in minerals were classified as landlocked or coastal. GDP = gross domestic product. Boldface denotes case-study countries. Italics denote middle-income status. Agriculture's share of GDP is for 2005 or closest year

Source: Diao Xinshen, James Thurlow, Samuel Benin, and Shenggen Fan. 2012. Strategies and priorities for African agriculture : economy wide perspectives from country studies. IFPRI

Tip – The importance of open access data during Step 1 – global data bases

For many countries, getting access to country level statistics can be a real challenge. We know that in certain regions such as Africa, there is little publicly accessible data on natural resources and demographics on country level. However, there are certain global resources where auditors can access open country level data. These can be helpful tools in a planning and research phase of an audit, where auditors are still getting to understand the sector.

For data on agriculture, population and production visit FAO Data bank on

<http://www.fao.org/faostat/en/#data>

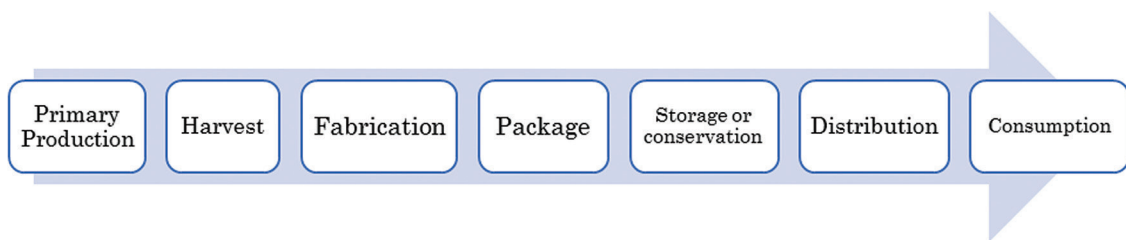
For health and demographic data that can provide information about nutrition see for example www.healthdata.org

Understanding the value chain

The concept of the production chain comes from the filière approach from the 1960s 'meso-level' field of analysis rather, started by studying contract farming and vertical integration in French agriculture in the 1960s to establish a "chain of basic products". The fundamental principle to identify a production chain according to this approach lies in the mapping and quantification of product flows from one actor to another. Hence, internationally, some of the names used are: value chain, agri-food chain or market chain. In fact, the FAO defines agrifood chains, such as the stages of agricultural production of food, which follow processes that go from production to consumption, through transformation, marketing and distribution.

This methodology considers the production chain, since it synthesizes the structure and dynamics of agriculture and food production. For this reason, it constitutes the central axis for the definition of audit topics.

Figure 11. Production chain



The **primary production** is defined as "one of the main and most important activities for the subsistence of the human being, since grains, cereals and vegetables are cultivated". Within this phase, water and soil are the most important elements; from these and other elements, it is possible to maintain control over this phase.

Harvest includes the concentration of primary production and the proper management of it, for its subsequent commercialization, consumption or industrialization. The main elements, associated with this phase, can be: the materials used, the techniques used, and the presence of foreign elements and contaminants.

The main phase, related to the production of food is the **fabrication (production)** of the products, which includes a whole set of elements, to ensure that a food is healthy and suitable for human consumption. In this case, the main element is safety.

The stage known as **packing or packaging**, is present after harvesting and manufacturing. The important element of this phase is the presence of foreign elements and contaminants, however, there are other conditions or variables that may affect this phase of the production chain, such as: the materials used, the labeling and the documentary record.

The **storage or conservation** is the phase, in which, the products of the field and the processed foods are analyzed and released to go out to the market. Cross contamination is an important effect, and can be triggered by the presence of physical, chemical and biological factors inside the warehouse, by inadequate storage or by the inputs used for food preservation.

The **distribution** of the products of the field or of the finished products, must guarantee that they are transported in a suitable way. The main element lies in the type of conservation: cold, at room temperature or hot. Other factors have to do with the documentation of the load.

The **consumption** is the phase where the result of the previous processes is evident to guarantee the delivery of healthy and nutritious products to the consumer. There are several elements related to its control, the main ones have to do with regulations, health permits or registers, consumer rights and the food sovereignty model of each country.

Depending on which topic the auditors want to look into, they could also be required to go further into the details of the value chain, and which actors and activities each stage contain in relation to the area investigated. For more guidance, see appendix II.

The role of global trade and social protection in relation to the production chain

A country's involvement in regional or global trade is also important to consider. Global trade patterns affect conditions for trade of agricultural commodities, including price, export markets, pressure on resources as well as social conditions in the countries where food is being produced. Global trade creates the opportunity of cheaply produced food, but consumers are not always aware of the real costs of the food produced. The agriculture and food production sector is one of the work sectors where social protection for workers are not well established. If crops fail or demand for produced goods decline, the workers are often fired and will lack a social insurance provided by their employer or the public, for compensating for the lack of income.

Studies done by the International Labour Organization (ILO) suggest that rural poverty is a driver of a host of social problems, including hunger and malnutrition, poor working conditions and exploitation of children.

According to the International Labour Organisation, the informal sectors such as agriculture, attracts many vulnerable groups such as migrant workers and women, who are vulnerable to discrimination. This low-threshold entrance to employment also comes with little job security and often entails exploitation of those who get employed.

ILO reports that there have also been extensive cases in the fisheries sector involving human trafficking and force labour. According to reports migrant workers in particular are vulnerable to being deceived and coerced by brokers and recruitment agencies and forced to work on board vessels under the threat of force or by means of debt bondage.

These observations suggest that consumers, food manufacturers, and importers of commodities and produce have a special responsibility to ensure the social sustainability of the goods or products they produce or consume. In addition governments needs to put in place schemes that reduces these risks in the country of production and to control the accountability of the food value chain, if commodities have been imported.

Sources:

World Social Protection Report 2017–19 Universal social protection to achieve the Sustainable Development Goals. International Labour Office – Geneva: ILO, 2017

Forced labour and human trafficking in fisheries (article') <https://www.ilo.org/global/topics/forced-labour/policy-areas/fisheries/lang--en/index.htm>

STEP 2. MAPPING OF THE GOVERNANCE OF AGRICULTURE AND FOOD PRODUCTION AND IDENTIFICATION OF STAKEHOLDERS

Food production and agriculture activities are sources of nutrition as well as income. The role of government is to enable and secure the food production, regulate production and distribution and protect consumers.

There have been some major international responses to the rising challenge of hunger and increased pressure on agricultural and environmental resources. For auditors one place to start looking at government responses could be to study the relevant SDGs and map their country's commitment to implementing these, in particular SDG 2 and its targets.

When looking at government response the SAI also needs identify national objectives and gain an overview of government responses to achieve these objectives. For the purpose of this guide we have summarized the following objectives;

- Secure and improve agricultural production
- Ensure food security and in some cases self-sufficiency
- To protect natural resources affected
- Mitigation and adaption of climate changes
- To contribute to the development and sustainability of rural communities
- Food safety and control in the production and distribution chain

What are the key instruments to ensure food security and sustainable agriculture?

In the following tables we present some of the principal instruments the government has at its disposal to achieve these objectives.

Figure 12. Secure and improved agricultural production

Research and technology development	To produce knowledge about current status, develop new tools for better farming techniques, research and develop crop types that are resilient and produces a larger yield at a better quality
Legislation	A legal foundation for the sector, including duties and rights of different actors
Monitoring	A monitoring system is ideally put in place to gain oversight of the development of the sector
Subsidies and economic incentives	In order to sustain and improve production incentives can contribute to change practices by providing the help needed to change to better methods or better-quality crops.
Training	Introduction of new crops and techniques to improve productivity usually requires guidance and training for farmers to be sensitised to, understand and be able to apply new techniques
Cooperatives	Cooperatives could be a tool to secure farmers income from their production and a way to distribute products, especially in areas where farmers have problems reaching the markets

Figure 13. Ensure food security and in some cases self-sufficiency

Strategy	A plan or strategy document as a steering document that considers the current situation of food security, and future needs and responses, based on thorough risk analysis and consideration of target groups, food staples available, demography and future needs.
Distribution system	Government can put in place a system of distribution that both give access to food and seedlings to local populations, and that helps distribute and store food.
Monitoring system	Food security policy should be accompanied by a monitoring system that captures emerging risks and allows government to be responsive to development.
Storage	Government can establish food storage facilities to ensure consistent distribution over time, and be responsive in case of crises

Figure 14. Protection of natural resources affected

Legislation	Protection of environmental resources normally requires strong legal foundations – the environmental sector usually have its own legal framework while the agriculture sector have their own acts. Acts on agriculture should have well defines statutes in relation to environmental management, principles, standards and limitations
Regulation	Legislation is usually accompanied by more technical regulation of agricultural activities. In relation to environment these regulations usually encompass thresholds for pollutants and instructions regarding use of fertilisers and pesticides, as well as timing, method and extent of activities and techniques
Environmental impact assessment	Environmental impact assessment provides government with information about possible negative effects on existing resources and local communities for prospective development such as land conversion and land use change. It is therefore an important tool for government to use in development of and within the agricultural sector, to avoid interventions that will have negative impacts that outweighs the benefits
Conservation	Conservation measures is an important tool to create sustainable agriculture sector. Leaving certain areas undeveloped also in rural areas ensures the sustainability of ecosystem services. Protection of important species that are at risk, also includes education to local population to change habits, for example reducing habitat loss due to damage by forest fires by limiting burning of crop land in dry season
Subsidies and compensation	Changing attitudes towards more environmentally friendly agricultural practices could require financial support to enable the change. Economic compensation could be on measure to ensure that forest areas or other specifics biotops are left unused by farmers. Technology that can reduce water use in farming, could be subsidised to create incentives to modernise practices
Monitoring data	The government needs to collect sufficient and accurate data on environmental status regular to be able to adequately monitor development of resources, as well as identifying needs to mitigate trends.

Figure 15. Mitigation and adaption to climate changes

Monitoring of emissions	Government should have in place a system for collection of data to observe development of GHG emission from the agriculture sector
Mitigation schemes	Mitigation schemes in the agricultural sector usually includes way to reduce emissions from agricultural activities
Vulnerability assessment	A vulnerability assessment that gives information about climate change will affect the agricultural sector, is an important tool for government
Adaptation measures	These could be programmes with targeted measures put in place to address the potential impact of climate change for farming, such as irrigation schemes to reduce water, barriers in case of flooding etc
Economic policy tools	Subsidies could be used to promote farmers to take preventive measures to reduce impacts of climate change. Economic compensation could also be used as a tool for farmers that have experiences the consequences of droughts brought about by climatic changes, or where crops have been destroyed due to extreme weather, as an incentive to create alternative employment.

Figure 16. Contribution to socio-economic development and rural development

Rural Development Programmes	A rural development strategy is often accompanied by a larger programme which may cover a range of objectives to strengthen development in rural communities
Subsidies	Subsidies are intended to spur or maintain new practices, often in the form of project funds targets group can apply for. To be effective projects need to support activities that are relevant, sustainable and lead to improved conditions
Investment schemes	Similarly, Rural Investment Programmes can contribute to larger development in rural areas, such as investment in common processing tool in a community, such as oil, bread or rice mills. Investment schemes could also encompass infrastructure investments such as health services, roads and school, that help the communities manage better on their own.
Distribution systems	For isolated areas, a governmental distribution to secure access to grains, and later to distribute produce could be set in place.
Support and training	Introduction of new forms of practices should be accompanied by appropriate training to the users. Also programmes to development of new skills that can improve livelihoods through diversification of income sources, better processes and establishment of new businesses, especially for the younger population.

Figure 17. Food Safety and Control and in the production and distribution chain

Regulations, standards and prescriptions	Government should establish clear standards and values that define and prescribes permitted levels of pesticides, additives or otherwise relevant ingredient in produce, as well as nutrient levels. Equally these standards should prescribe principles and timelines for permitting use and distribution, in relation to sales and consumption.
Control system	A control system should be put in place in relation to all steps of the value chain of agriculture and food production with the aim of ensuring that standards and regulations are adhered too. When the control system is implemented on local level, the central government has a responsibility to follow-up, making sure that controls are carried out similarly across regions.
Monitoring	Monitoring of values of nutrients as well as levels of toxins, bacteria or pesticides in food over time through samples obtained from producers and controlled entities allow for the authorities to have a good overview of the effectiveness of food safety system, and to measure the level of food safety.
Awareness and communication	Information about hygiene and safe preparation can be useful both for producers and for consumers.
Support and training	Training and guidance is a key if government is to ensure that producers and distributors, as well as local entities of control has a good understanding of regulations and are able to apply the standards correctly.

Who are the key players in the agriculture sector?

In Step 1 a generic value chain for the agriculture sector was presented. In each of the stages explained there are actors involved. For auditors to have good understanding of the rationale behind governance systems in the sector, and the intended recipients who are being governed, or are being supported or regulated, auditors need to know about the different actors involved in activities. This guidance does not intend to list the role of each potential actor; instead it points out some actors to keep in mind in the process because of their vital role to agriculture;

The grassroot actors - The social organisation of farms and rural communities could vary greatly. Being aware of the dynamics is necessary both for government but also for auditors. An understanding of these aspects is key to achieving a sustainable agriculture

Local and regional administration – Since so much of activities in this sector is governed on a local level and because regional variations play an important role, the auditors need to understand which responsibilities are allocated to these levels. Also; the degree of decentralisation of activities that are intended to contribute to national goals needs to be considered, because the shift of responsibilities further away from the national government entails certain risks in terms of management; while it also creates benefits through being closer to users.

Non-governmental organisations – In many countries NGOs are key players when it comes to sustainability, including protecting the interest of local communities and protection of environment.

Market actors and cooperatives – Especially when it comes to price setting, distribution and food control measures the market actors needs to be considered.

Technical and Financial Partners – In many countries the contribution of Technical and Financial Partners (TFPs) in agricultural development, livestock breeding, fisheries and environmental management is considerable.

Central government players – Governing the agricultural sector requires the coordination and cooperation of several Ministries and entities, responsible for agriculture, rural development, infrastructure, research and development, environmental protection and finances. The example from Cameroon highlights this.

Example - Governance structure for Food Security in Cameroon

<p>The Ministry of Agriculture and Rural Development (MINADER) is responsible for the development and implementation of Government policy in the areas of agriculture and rural development. The design of strategies and modalities for ensuring food security and self-sufficiency and monitoring their implementation are within its competence. It ensures coordination of crisis management in agriculture and monitoring of food security and vulnerability.</p>	<p>The Ministry of Livestock, Fisheries and Animal Industries (MINEPIA) is responsible for livestock development, fisheries and animal industries, hereunder; the control of the sanitary quality of food; The development of the animal sector and aquaculture; improvement of pastoral extension; health protection; The development of the animal and fish industry.</p>
<p>Ministries supporting Food Security</p> <ul style="list-style-type: none"> • MINEPAT (Ministry of Economy, Planning and Spatial Planning) with huge funding in large agricultural projects called AGROPLOLES) • MINTP (Ministry of Public Works) carries out roads to open up agricultural basins) • MINPMEESA (Ministry of Small and Medium Enterprise, Social Economy and Crafts) provides financial support to young agricultural entrepreneurs) • MINIMIDT (Ministry of Industry, Mines and Technological Development) encourages the industrialization of the agricultural sector with the construction of processing of agricultural products like the modern oil mills. • MINCOMMERCE (Ministry of Commerce) plays a key role in marketing and stabilizing prices of cash crops such as cocoa, coffee, etc. This ministry also builds warehouses and agricultural markets 	
<p>Other key government entities to mention is</p>	
<p>The Chamber of Agriculture, Fisheries, Livestock and Forestry (CAPEF) is an authority of producers and other actors of the sylvo agro pastoral sector in Cameroon.</p>	<p>The National Agronomic Research System with the IRAD (Institute of Agronomic Research) is the main center of excellence in the selection of the best plants in Cameroon.</p>

Sources: Cameroon: Economic Opportunities in the Rural Sector (Agriculture, Livestock, Fisheries and Forests), presentation by the Cameroon Chamber of Agriculture, Fisheries, Livestock and Forestry, 2017.

STEP 3 SELECTING AUDIT TOPICS AND PRIORITIES THROUGH RISK ANALYSIS

In Step 3 of the auditors will select their audit topic. In this process the audit team uses risk assessment tools to analyse the information gathered in Steps 1 and 2. The objective is to assess status and government response in light of opportunities for improvement. Risk assessment in this case means understanding the systemic potential and actual deficiencies in government policies and their potential consequences.

Overall, analysis of audits conducted and literature on the topic, show that there are some specifics in terms of governance risks that are especially visible and could be considered in audits of agriculture and food protection. These are summarised below:

Figure 18. Governance issues that could be considered in the audits

Issue	Observations	Example 1	Example 2
Cross-sectoral objectives	Objectives and efforts are not properly assessed and coordinated	Protection of environment vs increased agricultural production	Forest management under the responsibility of agriculture is down prioritised
Fragmentation of responsibilities	Undefined or allocated roles leads to inactivity and lack of follow up	Lack of follow up of controls at local level are not corrected by measures at state level	Environmental impacts of new practices are not reported to the right authorities
Governance of public private interests	Government has limited means to address unsustainable practices of private producers	Government has difficulties regulating amounts of use of fertilizers on larger farms	Private forest owners do not afforest after logging.
Lack of monitoring data	Government lacks data and steering information	Difficult to project production needs	Difficult to estimate effects of policies
Increased risks of misuse of funds	Subsidies to agriculture actors are not controlled	Subsidies to local farmers doesn't reach recipients	Subsidies are not used as intended
Complex systems that increases risks to efficiency and effectiveness	Difficult to ensure roll-out and equal application of policy tools on local level	Untimely implementation of programmes reduces impacts	Difficulties in measuring results

While these risks could be identified throughout the sector, it could be helpful for auditors to conduct their risk assessment according to the different objectives or sub-areas of agriculture policy, to evaluate what are the risks to systems and implementation of policies within each area. Below we present potential questions to ask in two sub-areas, food security, and agricultural production and rural development. It should be noted that the risk in these areas can also be identified under the other areas, the purpose is to get an introduction to the approach of assessing risks. Because agricultural policies are more than just systems and accounts, the auditor could benefit from assessing risk considering the 3 E's, Effectiveness; Efficiency and Economy. The concept of the three E's are thoroughly explained in ISSAI 300 and guidelines, and even in other INTOSAI WGEA documents; we will therefore not go into great detail, but simply explain the labels, and how they relates to processes and further suggest some general key questions which could be helpful to ask.

3 E's in the Agriculture sector

Economy – In short economy relates to the inputs in the systems, considering both current and future costs, and the use of resources

Efficiency – Efficiency describes the relationship between input and output. If the output was as intended using only the input provided, the process or in the case of governance, the policy, policy tool or system is efficient

Effectiveness – relates to goal achievement – what is the outcome of the process and in environmental audit we also consider potential impact;

Ensure food security and in some cases self-sufficiency

As we have seen, food security requires government to have in place a policy for the current situation, plan for crises, as well as a plan for future needs.

Have government put in place a food security plan or strategy?

If government has not developed a plan for obtaining food security for the country, this poses a risk to achieving it (effectiveness). Furthermore, there are several potential risks related to the strategy or plan itself.

Is the strategy based on actual needs of the country and its population?

The plan may not be based on an assessment of vulnerabilities and needs – A food security strategy requires government to consider nutritional value of the food sources produces against the nutritional needs of the population. If the plan is not consistent in describing the food staples that are best to meet these needs against vulnerabilities of the country this could represent a great risk to food security.¹⁵

Furthermore, the plan needs to take into accounts needs of the most vulnerable groups. These could be isolated rural communities, or indigenous people. A growing population will increase the percentage of children and young people. If the strategy doesn't take these issues into account, it increases the risk that the implementation of it, will not be efficient or effective.

In a study on how indigenous people were considered in relation to food security, research revealed that government made the assumption that by focusing on mainstream cash crops the indigenous would be able to earn enough income to buy more than they would have produced in home production. However, this assumption turned out to be fundamentally flawed, because markets in which indigenous can participate are scarce. Eventually, this approach would then create a risk to food security for this group of the population.

¹⁵ Food Security, Nutrition, and Health in Costa Rica's Indigenous Populations. Herforth (2007).

Is the strategy responsive to existing problems and responsive to crisis and future changes?

If auditors observe that there is an existent gap between the actual need of the population and the food produced and provided, this in itself suggests a risk to effectiveness. Surely, a new strategy, for example as a mean to implement the SDG 2 could be a means to correct the current situation, but if the existing policies are far from meeting these targets, there could be a risk that measures under the plan are not effective enough to remove this gap, and the meet additional needs for the future.

For auditors evaluating the sufficiency of existing measures is therefore key to uncovering risks to efficiency and effectiveness. Moreover, if the current situation is not adequate, there is a risk that the projections for the future are also unrealistic. This could also create a risk to economy, as this could mean that achieving targets on food security could become costlier for government.

Another issue is whether the food security plan is responsive to crisis. By that we mean to ask whether governments have factored in responses to planned or unplanned occurrences such as the impact of climate change for the country, in the form of drought and floods, but equally pest and diseases that may affect crops and animals. If the plan does not cater for these aspects there is a risk to efficiency and effectiveness. Moreover, there is a risk to efficiency if the system does not allow for changes in response in these cases. Lack of flexibility in disasters situations and emergencies could jeopardize the wellbeing of the population further.

Are food distribution systems working as intended?

In addition to assessing the sufficiency of the measures, the actual systems in place should be considered. There could be multiple reasons for the gap between the actual need of the population and what the country meets. While most countries are dependent on some sort of import of goods to be food secure, lacks in domestic production and nutrition could also be due to weaknesses in the food distribution system. We can talk about a risk to efficiency if the system put in place do not provide the output intended. To secure a proper yield, farmers are dependent on timely distribution of crops so that they can saw in the right seasons. If seeds are not distributed in time, or even at all, it could have dire consequences for several communities. Distribution systems also have an inherent risk of mismanagement of funds and resources. This could be considered a risk to economy. Lacking documentation and weak control could lead to uneven distribution of resources in favour of certain areas or even farms. Mismanagement of storage facilities could lead to loss in crops or harvest, creating consequences for recipients and greater parts of the populations.

Improve agricultural productivity and contribute to rural development

The government's effort to sustain and improve agricultural productivity, should consist of policies that leads to activities that are relevant, stable and sustainable for the agriculture sector. The same principle applies to government's efforts to contribute to rural development. In both cases it demands a lot of government in terms of providing the appropriate and effective tools.

Are measures based on research and sufficient knowledge?

To improve quality and quantity of crops and livestock, there need to be a basic level of knowledge. Agricultural research programmes either aim to develop better products to

cultivate, or to come up with new technology that increases efficiency of farming, in some way, by reducing use of manpower or using better tools or techniques. If the agricultural sector of a country heavily relies on these results, it places demands on the research institutes in terms of coming up with solid results. A risk to effectiveness in Research and Development could therefore have impact on the sector.

Policies and reform programme need to be based on sound data and information for the interventions to improve productivity. If there are gaps in that knowledge in public administration or if measures are developed without using the information available, it creates a risk that the interventions in the sector will not be efficient and will not lead to the objectives intended.

Do agricultural measures take into account local knowledge and conditions?

The participatory principle is an important one when it comes to rolling out projects that aims to lead to growth in an area or to improve food production. If local actors are not consulted when developing these policies, there could easily be a risk that policies put in place will fail. This applies in particular to introducing new crops and farming techniques.

Research suggest that when programme benefit from farmer's traditional knowledge in addition to the new resources, this reduces the risk of introducing new crops or techniques.

According to Anthold and Zijp the introduction of Maize to replace the local grain Teff in Ethiopia, led to problems when the new grain turned out to not be equally resistant to drought, and also had a lower nutrition value. Also, in Bali Indonesia in connection with the Green Revolution, the introduction of rice cultivation led to pest and damages and led researcher to conclude that local husbandry techniques were more efficient.¹⁶

If government do not roll out measures through collaboration with local communities, and if programmes are not responsive to the feedback and knowledge of the farmers, there is a risk to effectiveness and efficiency of these policies.

Is the programme designed in a way that allows for targeted, relevant and sustainable agriculture and food production?

In addition to considering whether new crops or techniques are relevant in light of conditions and practices, government also need to choose the right interventions.

When it comes to rural development programmes, the willingness to introduce a measure can in some cases outweigh the relevance of the measure introduced. Consultation with the target group have already been mentioned. In some cases, there may be a need to implement programmes or compensation schemes that alleviate unforeseen events like drought or pests. However, in general, government should take efforts to ensure that the programmes with its combination of policy instrument will lead to activities that are meaningful in the context of the rural communities in question.

Educational programmes meant to introduce new skills in a community should be designed with the intended users in mind. Equally it needs to provide the level of skills that heightens the qualifications of the student and differentiates his or her skill sets from the rest of the community and adds something to it. If the idea is to create a new trade or commodity in the community, sufficiently many participants needs to receive the trainings. A poorly designed programme creates a risk to efficiency.

¹⁶ Working Paper Summaries: Participation in agricultural extension. Anthold and Zijp (1996).

Are activities accompanied by sufficient information, communication or guidance?

A study on community-based practices argues that flow of communication and the exchanges between different actors are extremely significant, especially to understand the current state of agriculture and to facilitate the learning process.

In roll out of programmes or project, initially the sensitisation process is key. Lack of information about the activities, leads to a lack of results. If local farmers are the target group for a subsidy, but the farmer needs to apply to get this subsidy, misplaced outlets for information, for example that information are only distributed through a regional office, reduces the number of users of the subsidy, which is a risk to efficiency of the programme. Other scenarios could be a lack of guidance for applicants or participants in programmes, or inappropriate processes with extensive application documents, that are difficult to understand for the applicants.

Also, in the roll out of new practices and techniques, training and guidance is key. Introduction of new crops, should be accompanied by sufficient training of farmers, teaching them the quality of the seedlings, and more importantly the need to adjust current practices to have a good yield. Ideally, in the roll out of new techniques and introduction of new crops, a part of the roll-out should be follow-up, to observe potential difficulties, and provide guidance and adjustments to activities.

Training and guidance are equally important in investment schemes. In many cases agricultural investment programmes that intended to improve access to markets by procuring processing equipment, finds that after a period the new equipment is not being used, because of lack of skills in maintenance and repairs, and because this also can be costly.

Are subsidies sustainable and contribute to changed practices and improvement?

Subsidies and economic incentives are a main part of the policy tools for agriculture. However, in some cases subsidies are not designed in a way that makes them sustainable over time, causing a risk to economy. In the case of introduction of new crops or expansion of the activities to increase food production, the economy in the sector must be considered. In many countries there is of course a conscious choice by government to use subsidies to ensure food production. However, if the continued level of production requires subsidies long-term, this should be considered in light of costs. In particular this applies to new subsidies. If it turns out that activities do not continue after programme finished, this may imply that there is a risk to economy and efficiency.

On another note, a heavily subsidised sector, implies a risk of fraud and corruption. Lack of sufficient documentation, internal and external control, usually poses a risk to economy, but eventually also the effectiveness of the instrument.

Selecting the audit approach and topic

Audit issues related to agriculture and food production, can be oriented towards the evaluation of compliance with the laws, regulations and agreements that govern the critical factors of the production chain phases, and be carried out within the scope of compliance audit described in ISSAI 400.

On the other hand, audit topics can be directed towards the review of actions, systems, operations, programs or activities related to the critical factors of the production chain phases, in accordance with the principles of economy, efficiency and effectiveness, that define the performance.

When carrying out audits of agriculture and food production, one can assess both performance and compliance components. Agriculture and food production are two activities that are directly related, consequently, some of the critical factors can be maintained during several phases of the production chain.

For example, SAI Costa Rica has conducted several audits on the agricultural sector, using mainly performance and compliance audit methodology¹⁷, hereunder;

- Performance audit related with the results of the programs and projects of the National Foods Plan (PNA) (2011)
- Coordinated Audit of the Agriculture Plan 2003-2015 for Rural Life in the Americas. (2012)
- Performance Audit on the Coffee Institute of Costa Rica – Objective was verifying the achievement of their institutional goals (2013)
- A compliance audit on the Costa Rican Fishery and Aquaculture Institute, centered around sustainable Use of Marine Resources (2014)
- Performance Audit of the Promoting Corporation for Livestock of Costa Rica (CORFOGA) (2015)
- Performance Audit on Effectiveness of action in the agricultural sector for mitigation, adaptation and risk management of the effects of climate change (2016)
- Performance Audit on Effectiveness of the Phytosanitary Service of Costa Rica in securing chemical food safety in human consumption (2017)
- Coordinated audit on Sustainable Development and the goal 2.4 (Zero Hunger) (2018)

After conducting the risk assessment in Step 3, a SAI could plan for whether to or how to follow up on the identified other possible topics in the agricultural sector and how to use the main audit disciplines to execute these audits.

While prioritising to select the topic will depend on risks detected by the risk assessment, finally prioritisation may relate to the kind of challenges the country or certain regions face. Another option is to look systematically at the different parts the production chain to help prioritise. Are the risks related to production, distribution or the quality of food being produced, or at the problem that agriculture governance that doesn't primarily target food production, for example by being channelled into other agricultural schemes, which may be rural development schemes? This will help determine not only the topic, but more importantly the scope of the audit. The scope defines the boundary of the audit. It addresses such things as specific questions to be asked, the type of study to be conducted and the character of the investigation. The scope of an audit is determined by answering the questions of what, who, where and when.

For example in US GAO's audit on food security and nutrition, the scope of the review focused on FDA activities related to food for humans and feed for livestock animals (animal feed). The team generally excluded activities concerning veterinary medicine or related substances, such as growth hormones or antibiotics.

Having selected the topic, and furthermore the scope of the audit we can move on to define the audit objective. The objective communicates what we want to obtain with the audit. This allows us to design the audit, which will be a help for us when we plan the audit.

¹⁷ Response to the INTOSAI WGEA Mini-Survey

STEP 4. DESIGNING THE AUDIT

Designing the audit is at heart an exercise to define the what and how of the audit. The first thing we need to know is what we want to achieve with the audit, that is to formulate the audit objective. Furthermore, we will have to come up with researchable question along the lines of inquiry we have chosen, define the audit criteria for each question, and identify which information we need. Then we need to elaborate the how – in other words the methodology we will be using to collect the information necessary.

The matrix is a tool that describes, among other things, the methodological tools needed to achieve objectives. Because the design matrix is developed during the planning phase of an audit, some of the material in the design matrix reflects what the audit team anticipates may happen, such as the emergence of limitations to the work or findings that result from the audit.

In brief, the design matrix provides background information and context on the audit and requires the audit team to provide the following information:

Researchable Question(s)

What are the key researchable questions, i.e., the objectives of the audit? The team should ensure each researchable question is specific, objective, neutral, measurable, and doable and that key terms are defined.

Criteria and Information Required and Source(s)

What information does the team need to address the question, and where and how will the team obtain the needed information? Examples of audit criteria might include laws and regulations, agency strategic plans or guidance documents.

Methodology, Including Data Reliability

How will the team answer each question and define the methodological scope of the job for each question? Examples of methodologies to be used might include surveys, document reviews, interviews, site visits, visual inspections, focus groups, expert panels.

Limitations

What are the engagement's design's limitations and how will it affect the product? Examples of limitations might include access to agency records, staffing and travel constraints, or data quality or reliability issues.

What This Analysis Will Likely Allow the SAI to Say

What are the expected results of the work? For example, will the report describe agency actions or programs, or will it evaluate agency programs and result in recommendations for an agency to improve its practices or programs?

Below we present two examples of design matrices used when designing audit on agriculture and food production.

Figure 19. Design Matrix for Audit of the government’s efforts to ensure rural development

Audit objective – To assess the effectiveness and efficiency of government’s strategy for rural development and sustainability					
Audit questions	Audit Criteria	Audit evidence	Methodology	Limitations	Possible Results
Do programmes for rural development adequately meet the needs of the rural population?	The activities under the programme are based on assessment on needs, and are relevant and feasible to implement	<ul style="list-style-type: none"> Analysis, assessments, documentation of consultations Data on conditions and needs in the targeted regions 	<ul style="list-style-type: none"> Document analysis Comparative analysis Survey to local administration Survey to local populations 	<ul style="list-style-type: none"> Lack of data on regional and local conditions Risk of lack of responses 	<ul style="list-style-type: none"> There has been a lack of consultation with local population The activities of the programmes are not in line with needs
Is the programme managed in an efficient way?	There are systems in place to ensure effective implementation, control and reporting	<ul style="list-style-type: none"> Programme documents Procedures for allocation and control Monitoring systems Reports 	<ul style="list-style-type: none"> Document analysis Analysis of sample of allocations and control 	Lack of steering information	<ul style="list-style-type: none"> Allocation criteria are not clear Documents Are lacking Controls are infrequent
Are programmes implemented according to principle of local participation	Implementation of activities are widely communicated to targeted groups	<ul style="list-style-type: none"> Activity reports Communication material and guidance 	<ul style="list-style-type: none"> Document analysis Interview with programme officers Focus group with participants 	Difficult to measure the effect of soft tools	<ul style="list-style-type: none"> little knowledge lack of sensitisation and guidance
Are programme and activities sustainable?	Activities are designed in such a way that it ensures continued activities after the programme ends	<ul style="list-style-type: none"> Results of finalised programme Information about continued activities 	<ul style="list-style-type: none"> Interview with programme officers Focus group with participants 	Too early to see effect of programmes	<ul style="list-style-type: none"> Activities not sustained after end of programme Introduction of activities not appropriate or too demanding for population

Figure 20. Design Matrix for Two Objectives in GAO’s 2018 Report, FOOD SAFETY AND NUTRITION: FDA Can Build on Existing Efforts to Measure Progress and Implement Key Activities a

Objective or Researchable Question	Audit Criteria, Key Information Required, Source(s) of Information	Methodology	Limitations or challenges that could affect the audit	What this analysis will likely allow GAO to say
Objective 1: What key food safety and nutrition-related activities has the FDA conducted since new relevant laws were enacted in fiscal year 2011, and how did FDA determine its priorities?	<p>Criteria: Legal requirements from statutory provisions and congressional reports.</p> <p>Definitions of food safety and nutrition-related activities from agency officials and relevant documents such as agency strategic plans.</p> <p>Information required: Key FDA food safety and nutrition-related activities and priority setting processes.</p> <p>Sources: Documentation and interviews from FDA such as regulatory actions, policy guidance, inspections, training, and research.</p>	<p>Scope: Activities and priority setting processes from fiscal year 2011 through 2017.</p> <p>Methodology: Review documents and interviews from FDA on the agency’s key food safety and nutrition-related activities and priority setting processes. Visually display results.</p> <p>Using an interview guide, obtain oral and written responses from FDA officials on the agency’s regulatory actions and policy guidance for food safety and nutrition.</p> <p>Confirm and describe legal requirements.</p>	Preliminary information indicates there are not clear definitions for food safety and nutrition, and there is some overlap between the terms. For example, food labeling is intended to meet both food safety and nutrition goals. As a result, the number and purpose of regulatory actions and guidance documents may not be limited to one or the other area because they are not mutually exclusive.	<p>We will be able to quantify and describe FDA’s key food safety- and nutrition-related activities conducted since relevant new laws were enacted.</p> <p>FDA may not have written procedures on how the agency decides to pursue regulatory actions vs. policy guidance. If we find that this is a deficiency, we will describe the cause and effect of the deficiency and consider making a recommendation to address the issue.</p>

Objective or Researchable Question	Audit Criteria, Key Information Required, Source(s) of Information	Methodology	Limitations or challenges that could affect the audit	What this analysis will likely allow GAO to say
<p>Objective 2: To what extent has FDA set goals for food safety and nutrition-related activities from fiscal year 2011 to the present, and how is FDA measuring progress toward those goals?</p>	<p>Criteria: GAO reports on performance management practices and on attributes of successful performance measures.</p> <p>Information required: FDA food safety and nutrition-related goals and measures.</p> <p>Sources: Documentation from FDA, such as annual or strategic plans and reports that describe FDA goals, objectives, and performance measures.</p> <p>Data from FDA’s online tool to track agency wide program performance.</p> <p>Interviews with knowledgeable agency officials about challenges FDA has faced in developing performance measures as well as reasons why and potential consequences.</p>	<p>Scope: Relevant FDA activities from fiscal years 2011 through 2017.</p> <p>Methodology: Collect and describe information on FDA’s food safety and nutrition-related activities; FDA’s corresponding goals, objectives, and performance measures; and FDA’s efforts use of performance measures to assess progress toward its food safety- and nutrition-related goals.</p> <p>Assess the reliability of FDA data by interviewing knowledgeable FDA officials, reviewing related documentation, and performing manual data testing.</p> <p>Assess and describe the extent to which FDA performance management practices meet applicable leading practices.</p>	<p>Our ability to report on FDA data will depend on our assessment of its reliability.</p>	<p>We will describe FDA goals for food safety and nutrition-related activities from fiscal years 2011 through 2017.</p> <p>Describe the extent to which performance measures enable FDA officials to assess progress toward strategic goals for food safety and nutrition-related activities and the extent to which performance measures meet leading practices. We will likely be able to describe the cause and effect of any deficiency and consider making a recommendation to address the issue.</p>

*This is an edited version of the design matrix developed for this chapter. GAO edited the matrix for clarity and length.

Chapter 3

Audit experiences, good practices and methodology

This chapter presents possible sub-topics and lines of inquiry of auditing agriculture and food production. The groupings below are based on information from audits carried out by INTOSAI WGEA members. It synthesizes the risk and findings common for governance of different areas within the sector.

After analysis of responses from the INTOSAI WGEA Survey and the body of audit on agriculture and food production in the INTOSAI WGEA Database, the following overall categories were identified, where lessons can be extracted

- Food security
- Food Safety
- SDGs and food production
- Auditing agricultural programmes for rural development
- Auditing agricultural programmes for improved productivity
- Auditing externally funded development programmes
- Auditing the environmental impact of agricultural activities

In the following sections we will present possible aspects to consider when conducting audits on any of these sub-topics.

AUDITING FOOD SECURITY

As presented in Chapter 1, on a global level the population growth is expected to be 10 billion in 2050, with the consequence that a greater number of people will be eating fewer cereals, meat, fruits and vegetables if urgent measures are not taken to address this exponential rise, compared to a food production capacity. On a national level, food security entails making enough food available and ensuring the population access to this food. It also requires government to plan long-term, prioritise and be responsive in a crisis.

Auditing food security policies requires the auditors to understand the country's preconditions for being food secure, such as the geographical and demographic factors described under step one in Chapter 2. This could help auditors understand the considerations governments need to take both in planning and responding to risks, but also in the actual implementation of policies.

Auditing food security normally involves assessing strategies for food security, their legal foundation and how these translates into actual policies, that is how they are implemented.

An audit can evaluate the appropriateness of a country's response in this area. Auditors then need to understand what the risks are to obtain the objective in the country context. Although there is a global food security definition, the assessment of availability, access and utilization will vary. An approach is therefore to assess whether government strategies take into account known risk areas, make the right priorities and target risk groups in terms of food availability and access, as well as nutritional needs. Equally, consistent access in the long-term perspective needs to be sufficiently met. This could cover both governments responsiveness to changes in for example food prices, as well as crisis response, for example in case of natural disasters.

SAI Costa Rica's audit of the National Food Plan

In the case of SAI Costa Rica, the SAI audited the processes and control of resources allocated to agricultural producers to implement projects and programmes under the National Food Plan (NFP), and their effects on food security and sovereignty. The national Food Plan is the country's response to a potential food crisis. In auditing the programmes SAI Costa Rica observed that inefficiencies in the foundation of the plan as well as the governance of it, reduced effectiveness and implementation of programmes under the plan.

The development of the NFP had weaknesses in selection of priorities related to crops selected to be used in the programs and projects. In the original plan the NFP only could finance projects and programs for rice, corn and beans land extensions, but this was later expanded to also cover production of other crops such plantain, cocoa, strawberry and potatoes, which were not originally included in the "food crisis alert" issued by the United Nations Food and Agriculture Organization (FAO) and the World Bank in 2008, to which the plan is a response. Also, originally the NFP was structured as a long-time instrument but the definitive document was a 3-years plan. The duration limits potential for evaluation of the effects and impacts of this plan in the national food security and sovereignty.

In terms of monitoring the plan, it lacked mechanisms for evaluation and adjustment, thus reducing government's capacity to be responsive to changes and needs, making the sector especially vulnerable to international changes in prices on agricultural commodities.

For auditors planning to look at the country's food security policies it could be relevant to consider

- The appropriateness of the National Food Security plan or strategy
- Whether the plan is risk-based and sufficiently addresses all levels of population
- Whether the plan allows government to be responsive in case of changes
- Whether the plan reflects the actual conditions of the countries
- Whether the strategy is accompanied by a realistic plan for implementation and relevant programmes and policies
- Monitoring and evaluation of the plan

A food security plan that meets the need of the population requires an implementation scheme. In some countries this includes putting in place food distribution systems, to ensure access to commodities at fair prices to lower income population.

SAI India's audit of the implementation of the National Food Security Act

SAI India carried out an audit on the preparedness for the implementation of the National Food Security Act in 2013. In this audit they considered the implementation of the orders on a Public Distribution System as well as the status of its implementation plans. In the case of India it was important to assess the implementation of the Act in an appropriate number of states, underlining here the necessity to ensure a representative sample of results, that could uncover larger deficiencies in certain parts of country, with potentially harmful consequences. In the case of SAI India, the SAI found that plan for implementation had not been prepared. Furthermore, in the checked state the storage capacity of food grains was not adequate to meet the three months requirement and the condition of the storages on state level was not appropriate. The public food distribution system that is supposed to ensure distribution of grains at affordable prices, also had deficiencies. There was also variation in practices on state level, and furthermore digitalization of the support system was not completed or was implemented with delays across the country. This led to limitations in terms of registering beneficiary and distribution data.

In summary this case illustrates the complex and extensive system that needs to be put in place to implement a food security Act. For SAIs interested in assessing the implementation they could assess

- efficiency and effectiveness of the systems put in place
- whether food distributions systems are reaching targeted recipients
- support systems to enable distribution are implemented and
- if measures are implemented in timely manners which allows consumers to access the support or producers' systems are giving the same results across regions
- whether food security measures are leading to intended results
- whether control of distribution ensure fair price
- whether systems for food storage reduce the risk of wastage to an appropriate level

AUDITING FOOD SAFETY SYSTEMS

Food safety ensures that produced and imported commodities are safe for consumers. Sanitary conditions and hygiene are questions of public health. Food production from livestock is also a question of animal welfare. Within the range of entry points, food safety can be approached by auditors by assessing the efficiency and effectiveness of a country's system put in place to ensure safe and sanitary food production, distribution and consumption.

Audits could scope the audit to cover local food production or imported food. A central ministry is normally responsible for achievement and implementation of food safety policies. The SAI's starting point could then be to verify whether central government are taking the right measures to ensure that the controls are effectuated as intended. Local producers are often regulated by a decentralised system, where control measures to ensure the hygiene and product safety of the commodities produced is allocated to regional local government entities such as regional boards and municipalities.

SAI Sweden's audit of central government's follow-up of food safety systems

Another option is to assess central government's follow up of the control system, and whether it reacts appropriately to problems in the food safety chain. This approach was chosen by SAI Sweden, where the aim of the audit was to investigate whether central government was taking sufficient measures to ensure that official food control is effective and appropriate. In the audit, the Swedish National Audit Office had taken as its point of departure known problems in the area of official food control that have persisted over time. The audit had therefore been focused on the measures the state actors have taken in order to solve the problems and the obstacles to finding solutions.¹⁸

A possible line of inquiry could be to assess the appropriateness of the central food control system by assessing

- whether national regulation is appropriate;
- whether effectiveness of the current system is being monitored and evaluated;
- And whether central government taking the correct measures to address problems;

Looking at control system itself, will often be necessary to understand which problems common, and how central government are could respond to correct this. A common risk and a finding when auditing local food control systems is that control frequency is low, often due to lack of resources. The audits also uncover that the inspections practices could vary between regions and even between inspectors in the same area, affecting the results of the controls. Lack of sufficient knowledge of the demands in legislation and regulations, explains both deficiencies found at the producers themselves, and insufficient quality of the controls themselves. Little follow-up to correct or sanction faults found in control, or conduct greater follow-up is another common issue. Possible lines of inquiries for auditing the Efficiency and Effectiveness of the control system could be to assess

- Appropriate and risk-based control frequency;
- Adequacy of understanding of requirements by inspectors;
- Whether inspections are risk-based and focusing on the important issues;
- Similar practices by inspectors;
- Whether identical observations are assessed similarly, and deficiencies are followed up appropriately?
- If there is sufficient guidance for the producers;
- Whether inspections comply with requirements;
- Whether results are reported to the next level of authorities according to requirements.

Methodology for food control system audits – vignette survey¹⁹

Vignette survey is a method that have been used by Office of the Auditor General of Norway in audits of food safety and aquaculture. In the audits the aim was to assess control and regulatory practices across regions. Vignettes are systematically elaborated descriptions of concrete situations. The vignette survey method is a social science method that can identify whether identical cases (vignettes) are treated or responded to

¹⁸ Executive Summary. Swedish National Audit Office. Food control – is central government fulfilling its responsibility? (RIR 2014:12)

¹⁹ Source – EUROSAI WGEA Method and Data – Good Examples 1 – 2012 The Vignette Survey Method.

identically. Relating this to auditing, vignette surveys can be used to investigate whether identical cases are treated identically by different public agencies, i.e. whether they have a more or less identical outcome. With reference to the **principle of equal treatment**, it is presumed that equal cases are treated equally unless good reasons exist for discriminating practices or exemptions to the rule. Vignette surveys are suitable for documenting how discretionary judgement is exercised in case processes, and how regulations are applied.

Vignette surveys are especially relevant when...

- risk assessments indicate that the same type of public offices treat similar cases differently
- the audits focus on policy effectiveness, i.e. the outcome of a certain policy
- the quality of public administration practices is a main focus
- the audit aims at calling attention to which consequences unfavourable case treatment have for the users of public services

It is recommended that constructed vignettes are based on real cases and have characteristics that are crucial for the expected outcome or decision. It is useful to construct and distribute several types of cases.

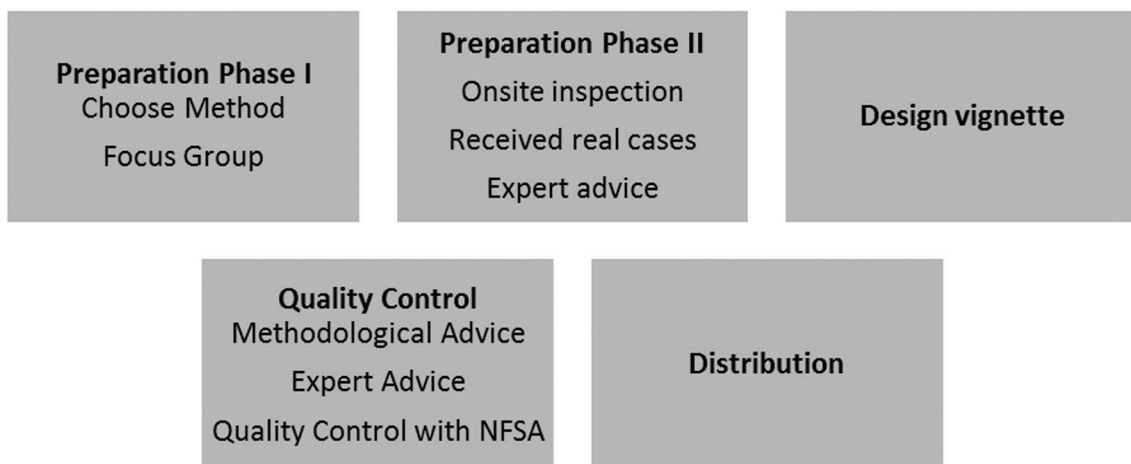
Distributing too many vignettes will be time consuming for both the project group and the public offices that are being audited. However, constructing several cases is often useful in the design process, as some may be rejected in the quality assurance process.

Auditors should exercise due care and attention when interpreting results – the objective is not to assess quality.

Observed variation in the treatment of cases should be considerably larger than what one would expect based on existing laws and regulations, and the scope of individual discretion.

Maintain communication with the relevant public agencies when analysing and concluding on results.

Figure 21. The process of preparing and conducting a vignette survey



AUDITING FOOD PRODUCTION AND SDGS

Brazil has taken the commitment to ensure food security through the launch of the “zero hunger program” that focused on eradicating hunger and poverty. In 2016/2017 SAI Brazil undertook an audit on government preparedness in implementing the Sustainable Development Goals, focusing on goal 2.4 on food production systems. Auditing the efforts of the Centre of Government and Public policies, auditors employed the SDGs model, which assessed the readiness of government and sectorial bodies in implementing SDGs. The audit showed that lack of alignment of public policies which generated inefficiencies and posed an obstacle to reaching the 2.4 target.²⁰

SAI Costa Rica’s Audit on SDGs and the Zero Hunger Goal

The SAI of Costa Rica, on its part carried out a performance audit of Sustainable Development Goals (SDGs) and goal 2.4 on Zero Hunger. It provided information on the monitoring of Management of the Government Centre for the implementation of the 2030 Agenda for sustainable development.

In an audit that covered the period September 1, 2016- December 31, 2017, auditors of SAI Costa Rica assessed the management of the centre responsible for implementing the 2030 Agenda and the 2.4 goal of zero hunger. They equally assessed measures put in place to check resilience to or against climate change, dry seasons, extreme meteorological phenomenal and flooding.

The auditors applied an evaluation matrix of the planning process to implement the SDGs. They also used electronic questionnaires sent to Ministries. They came up with the following findings

At the government centre, it was noticed that there were opportunities for improvement the implementation of SDGs in the areas of strategic and Risks management, coordination and joint public policies, supervision of public policies and the 2030 Agenda and in transparency and accountability;

Regarding the Zero Hunger goal 2.4 there were opportunities in improvement related to coordination and integration, as well as monitoring of results and transparency.

Methodology - Approaches to auditing Sustainable Development Goal 2 – Zero hunger

INTOSAI has in its Strategic Plan defined four approaches to auditing Sustainable Development Goals. One of these is auditing the preparedness of implementation of the SDGs. Both IDI and INTOSAI WGEA has developed guides on implementation of this approach. The auditor is therefore referred to this guidance to explore possible tools and methodologies for conducting an audit according to this approach.

Auditing agricultural development programmes

Typically an agricultural reform or a larger programme or policy could have several objectives. Auditors need to take this into account when scoping the audit, and if they want to audit the effectiveness of the programme. For the purpose of this guide food security has been presented separately and rural development and agricultural productivity will be looked at below

²⁰ Source: Response from SAI Brazil to the mini-survey on this project.

Auditing Rural Development Programmes

Rural development programmes could have several objectives covering self-sufficiency and social aspects. In some cases government aims to create activities that ensure livelihoods and economic development in the rural areas, or that promotes sales and production of agricultural commodities. It is also a tool to reduce migration from rural areas.

Audits of rural development programmes often uncover that the objectives of the programmes are not well-defined, and that the activities under the programme aren't necessarily appropriate to achieve the targets set. Furthermore, the lack of well-defined targets can be accompanied by insufficient or absent of indicators something that hampers the ability to measure the effectiveness of the programme. SAI Bulgaria undertook an audit of the measure 112 "Establishment of Young Farmers Holdings" of the Rural Development Program 2007 - 2013. After looking at Programming, achievement of objectives and reporting, monitoring and control of measure 112 the SAI concluded that while the measure has an enhanced social aspect to reduce migration of young people from rural areas, the results and success is not clear due to the lack of official statistics and analysis of trends on activities to stimulate young people to take jobs in the field of agriculture. The lack of information does not allow a proper follow-up of the effect of the measures within the Rural Development Programme and the introduced mechanisms aimed at young farmers.

Generally, lack of steering information back to government increases the risk of not uncovering whether a programme has the intended effect and leads to sustainable activities, and subsequently government will not be able to correct and change direction of the programme to ensure it contributes to achieving the objectives. This also applies to programmes where campaigns and education create the incentives for activities, for example campaigns that aims to introduce ecological farming, or to reduce food waste and buy local goods with consumers.

For auditors interested in auditing rural development programmes the lines of inquiry to below could enable the audit to evaluate the effectiveness of a programme;

- Are objectives well-defined and accompanied by appropriate indicators to measure results
- Are the right measures selected to achieve the objectives?
- Are the measures (campaigns, investments, subsidies, trainings etc) relevant for targeted groups?
- To what degree do measures contribute to sustainable changes?
- Do government monitor the effects of the programme?
- Are programmes cost-effective?

Rural Development Programmes also require roll-out on local and regional level, adding complexity regarding roles and responsibilities. The implementation of funds and subsidies to projects on local level poses risks of mismanagement of funds. Sai Czech Republic have extensive experience with auditing various agricultural development schemes. Some of their findings illustrate the challenges to government can face in implementation of such programs;

SAI Czech Republic's audit of funds under the Rural Development Programme

Auditors of SAI Czech Republic scrutinized management of EU funds under the Rural Development Programme. The funds were distributed by the Ministry of Agriculture. Auditors selected and scrutinized 120 projects, which had utilized CZK 375 million in total. The aim of the programme was to help modernize agricultural holds, boost entrepreneurship, develop tourism, and develop rural areas. By setting inappropriate rules the Ministry of Agriculture also enabled funding of projects, which did not serve such a purpose. For example, the auditors found that grants to help businesses in investing in biomass energy, where allocated to private recipients, which of some then after the programme period ended, sold the subsidized boilers.²¹

Auditors also discovered that for some projects, the provision rules allowed for allocated subsidies being used mainly for other purposes than the intended development, and in some cases not at all. The Ministry of Agriculture was not provided with accurate and sufficient information about the Programme's advances or efficiency, which could be used to evaluate the subsidies' effectiveness so that the Ministry would adjust its strategies. External evaluating partners sometimes selected too small sample respondent groups to carry out evaluations – for example, in one case the external evaluator called 15 selected respondents and used their answers to evaluate consequences of a measure, which should have impacted 119,000 people and was planned funding from public budgets would amount to EUR 17 million. Moreover, control systems were not efficient for the treatment of applications and reporting on results had weaknesses.

For audits on the implementation of such programmes auditors should consider the existence of a well-defined suitable application system including

- Compliance with the requirements of central regulations
- Existence and application of appropriate project evaluation criteria;
- Compliance with project selection requirements;
- Correct project ranking;
- Compliance with the requirements for approval of project payments;
 - If there are appropriate and efficient control systems for allocations and payment
 - Whether there are effective sustainability mechanisms introduced;
 - Whether coordination, reporting and communication between state level, regional is appropriate and done in a timely manner
 - Whether the project is being adequately monitors and results are reported

Auditing programmes to improve agricultural productivity

Implementation of programmes to improve agricultural productivity aims to improve quality and quantity of food and other commodities produced. Ideally, these programmes should have targets that are measurable, while the objectives may be formulated on an overall level.

²¹ PRESS RELEASE on Audit No. 14/26 – June 15, 2015

Agricultural schemes often target local population or rural communities through direct support or subsidies. Audits could reveal whether these means are reaching the target population, whether it is done in a timely manner, and whether the government has put in place to and verifies how money is being used.

Introduction of new practices in many cases means changing mind sets to adjust to the new ways. There is often a risk related to this aspect if government doesn't prioritise sensitisation processes, training and guidance adequately, as a part of the implementation. For example, if government wants to introduce a National Corn Programme that allows farmers to produce yield that they can store on longer term; there should also be information and measures to introduce the use of barns for storage in those communities where this is not common. Lack of education can lead to deficiencies in results if education about storage is not conducted. Audit shows that where promotion and capacity building was not sufficiently prioritised results of the programme was reduced.

From the perspective of assessing effectiveness, the objective of the programme may have been improved quality of produce. In these cases, it could be difficult for the SAI to assess quality improvement. Normally the SAI would have to rely on scientific results. Still, improvement of crop yield could be an indirect indicator of improvement in quality. In addition, improved quality of production should benefit the population in form of improved access to food, and reduced gaps between need and production could also be assessed.

Methodology – Verify the efficiency of the programme through surveying target groups

For auditors who intends to audit a programme on improving productivity, they should systematically collect information from the target groups. The process could look as follows

- identify the targeted group for the activity
- sample potential recipients across regions
- Reach out to target groups – to confirm correct actors – this could include farmers and local communities
- Trace intended and document process for the sampled group
- Survey sampled actors to verify process and obtain feedback about it

In planning such an exercise, it could be important to consider that there may be differences across regions, including planting seasons, which could explain variations.

It could also uncover such findings that registers for subsidies have inconsistencies between who signed the recipient slip, and who received the money or crops.

SAIs auditing external funding by agricultural development

Many governments benefit from agricultural investments and rural development programmes, funded and implemented by international donors and organisations or funded by external actors but implemented by governments themselves. In cases where the SAI has the mandate, the donor can engage the SAIs in auditing the programmes. From the SAI's point of view conducting these audits could be done on request of a donor or as a separate initiative in the following cases; if the implementation requires a counterpart payment by government i.e. public funds; if the programme is being implemented by government. SAIs could also audit the government's part to implement the programme. International technical and financial support to government often holds

a high-risk of mismanagement of funds, inefficiency of implementation and inability to achieve programme targets. Additionally, there could be relevant to look at whether the programme activities can contribute to reaching the intended outcome.

Audit of externally funded programmes on agriculture

For many SAIs, conducting financial and compliance audits would be the possible approach, to give assurance of the financial reporting, and compliance with legislation and regulation. This was done by a group of countries that conducted audits on externally funded projects in agriculture and food security sector in Gambia, Sierra Leone, Tanzania, Liberia, Malawi and Zambia, through a programme managed by the IDI. The main objective of this programme was to increase the involvement of SAIs in auditing externally aided projects in agriculture and food security sector, by supporting SAIs in enhancing their capacity and performance in conducting such audits. This programme also had the additional benefit that it reinforced the SAIs' competency in conducting financial and compliance audit according to the ISSAIs.

For SAIs mandated and competent to audit externally funded programmes they could possibly seek either to

1. Obtain reasonable assurance of the whether the financial statements as a whole are free from material misstatements, and prepared in accordance with applicable financial framework, also including
 - Verifying appropriate Asset declaration under the programme, including receivables
 - Verifying if payments are accompanied by supporting documents
 - Assess if all contributions to implementation of a programme have been disclosed
 - Confirm whether government's counterparts have been paid
2. or audit management and implementation of the programme through assessing
 - Are payments reaching recipients?
 - Are procurement regulations followed?
 - Are contracts management compliant and efficient?
 - Is reporting in compliance with the programme document
 - Are programmes being evaluated mid-term and at the end of the programme period?
 - Are the results of the evaluation of the programme given appropriate action?

Auditing the environmental impact of agricultural activities

Even if agriculture allows the population to satisfy a part of their food needs, in the absence of precautions it can cause in environmental problems: degradation of the aquatic environments, water pollution by the fertilizers and pesticides, uncontrolled deforestation which inevitably cause climate change.

While the responsibility for taking precautions to avoid or address environmental impacts rests with national governments, in the case of agriculture policies it needs to combine both the need for developing agricultural resources and protecting natural resources. Conservation often exists in competition with the objectives to feed and sustain the population. In this regard auditors for instance can

- evaluate the mechanisms put in place in their respective countries for the sustainable management of forests;
- assess the effects on the environment including water and soil of use of pesticides and fertilizers by farmers;
- verify the measures put in place to protect the biodiversity.

Forest protection in relation to agriculture

Management of forest resources is a responsibility often placed under entities governing agriculture and use of natural resource, while conservation lies with the ministry of environment. Often land owners have both crops and forests. A common problem is that forest management is not sufficiently provided for under (or not at priority) under agricultural policy; goal conflicts can arise when farmers want to cut down forests or change forests into agricultural land, and this goal conflicts are not always addressed sufficiently by government.

One such example we can see in the case of Jordan. SAI Jordan has during a compliance and performance audit assessed the protection of forests and woodlands. The scope of this audit was the audit of the processes and procedures put in place by the Directorate of Forests within the Ministry of Agriculture for the fiscal years (2014-2016) with regard to national regulations on forest management of State and Forest Trees No. 23 of 2016.

The audit showed that while the main legislation the Agriculture Act No. 13 of 2015 provides for the protection of plants, the protection of forests and woodlands (forest wealth) has not been specifically and directly provided for as required within the objectives of the Ministry of Agriculture.

Another observation was a lack implementation of fines and penalties provided by the law in the cases where people break the regulations regarding use of forest resources. They also found that there were increased risks related to conservation of the (forest wealth) due to the presence of private property within the forests and woodlands boundaries.

A possible consequence of lack of priority of forest within the agriculture sector, is the lack of knowledge regarding the extent of the problem of the deforestation. Lack of monitoring of forest resources and poor efficiency in dealing with forest fires, pest and deforestation in general could create larger problems for agriculture activities also in the longer run and assessing government's policies in this area could be one way to address this issue.

Possible aspects to audit within this sub-topic are;

- Priority and cross-sectoral goals within the Ministry
- Appropriate and sufficiently specific policy instrument
- Effective implementation of follow-up and sanctioning
- Efficient and effective approaches for regulating forest resources when forests are privately owned

- Adequate monitoring and analysis of development of forest resources, especially in growing economies where agriculture is a big employment sector
- Mitigation measures towards deforestation

Impact of use of chemical substance on soil and water

As with the state and development of forests, agricultural activities affect water and soil. In some countries use of pesticides and mineral fertilizers is the biggest source of pollution to ground water and soil. While the distribution of chemical substances to the agricultural producers can be regulated, use over time could be difficult to monitor, and hence it could be difficult to project consequences before it happens. Auditing the systems put in place to regulate and monitor the use and quality of water and soil, as well as sources of pollution from agriculture is an approach taken by several SAIs, for example in the case of Estonia.

SAI Estonia's audit on Supervision on the use of pesticides and mineral fertilizers

SAI Estonia conducted an audit on government supervision of the use of pesticides and mineral fertilizers. The auditors focused on the results of state monitoring of groundwater quality in the coming years in the face of pollution risks from pesticides and fertilizers. Through interviews, analysis of relevant documents and site visits, the auditors came to the following key findings;

According to the water monitoring data the nitrate content in ground water has increased. The quality of surface water is also deteriorating, as a result of which, there is less high-quality river and lake water.

The supervision provides assurance that distributors sell fertilisers following the regulations, but their use in enterprises is not supervised.

Some agricultural producers do not adhere to good agricultural practice and also violate mandatory requirements

The data of pesticides used in control work has been disclosed by official statistics in physical quantities, although it is more correct to express the quantity of active substance.

Inadequate monitoring and supervision of key resources such as water and soil, could lead to serious consequences. Lack of data or inappropriate measurement could hamper government's efforts to implement measures to reverse trends. As the findings of SAI Estonia suggests, quality of surface water could be seriously in jeopardy if it is not properly monitored, and government do not implement mitigation measures.

Equally assessing the implementation of regulation of chemical substances is an approach that auditors can take. SAI Thailand has also conducted a performance audit on the control of hazardous agricultural chemicals. The scope of this audit was the Hazardous Agricultural Chemicals Control System implemented by the Ministry of Agriculture and Cooperatives from 2012 to May 2015. The audit uncovered deficiencies in controls of hazardous agricultural chemicals, including prescribed checks. Guidance for sellers was lacking and, in some cases, sellers were not following regulations.

In summary relevant aspects under impacts by use and pollution of water and soil could be to assess the effectiveness of supervision and monitoring of water and soil hereunder;

- Use in relation to agriculture;
- Monitoring of pollution from agriculture;
- Quality and quantity;
- Collection and quality of monitoring data;
- Use of monitoring data as steering information;
- Implementation and follow up of regulation of use of chemicals in agriculture;
- Monitoring and mitigation of use of pesticides and fertilizers
- Analysis and use of impact assessment as steering information in regulation of use of chemicals.

Biodiversity - Government efforts to conserve species and resources.

Together with land conversion, deforestation and pollution, unsustainable agricultural practice can have serious consequences such as loss of biodiversity, which could be irreversible and have impact on ecosystems, including the foundation for agriculture. Conservation efforts and mitigations measure to reduce impacts, is key to avoid this. For auditors, audit of sustainable agriculture, should also cover this perspective.

As in the case of forest management the integration on conservation efforts in agricultural policies, is often characterised by goal conflicts, where development could lead to damaging impacts on species over time. The existence and quality of impact assessments could play a role, including the mapping of possible effects on species, through agricultural practices. Furthermore, lack of monitoring of species development could be a risk.

US GAO's Audit on Bee Health: USDA and EPA Should Take Additional Actions to Address Threats to Bee Populations

The United States Government Accountability Office (GAO) has done a range of audits under the sector of agriculture, and in particular evaluated efforts made by government to reduce impact on environment. Since bees play a vital role in agriculture by pollinating crops and flowering plants in ecosystems. The health of bee populations is important to food security and environment. US Government developed a strategy to protect pollinators against pollution and pests. In 2016, members of the U.S. Congress asked GAO to review (1) the bee-related monitoring, research and outreach, and conservation efforts of selected U.S. Department of Agriculture agencies; and (2) the U.S. Environmental Protection Agency's efforts to protect bees through its regulation of pesticides. GAO found that while the Environmental Protection Agency and the U.S. Department of Agriculture have taken some steps to protect bees, but both agencies should take additional actions to further protect both honey bees and wild, native bees.

In addressing conservation and protection of biodiversity in agriculture auditors could look at whether

- Government have conducted impact assessment to identify possible consequences of activities on species and vegetation
- There are conservation measures to mitigate possible effects of activities, such as reducing risks of displacing or deterioration of habitats
- There is sufficient and appropriate monitoring of biodiversity at risk and whether data is of adequate quality
- Government is sufficiently informed and can be responsive to needs by conducting and using research
- Regulation of known harmful substances and practices is efficient and effective

Methodology – The finding matrix as a tool for analysing audit findings

Analysing findings in an audit on environmental impact and conservation, can be challenging for auditors when it comes to establish cause and. It demands of the auditors to be particularly cautious when formulating their recommendations to be sure that the right medicine is prescribed. It could therefore be of help to use an analytical tool to help sort out the observations made. Below is the presentation of the use of a finding matrix as was used by US GAO in their audit on the health of Honey Bees and other Pollinators.

A “findings matrix” is a tool to promote discussions of audit findings and possible recommendations. The audit team uses the findings matrix toward the end of the implementation phase of the audit, meaning that the team has a good understanding of its possible findings and conclusions; this matrix helps to solidify that understanding while also developing a method for communicating that information to readers. GAO reports that their recommendations must clearly describe the four elements of any findings that support those recommendations.

The four elements of a finding that the audit team must describe in the findings matrix and in the audit report to support a recommendation are the following:

- **Condition** - what the audit found; the situation that exists
- **Criteria**- the standards for what should be (e.g., laws, regulations, agency guidance documents, etc.)
- **Cause** - the explanation of why the condition deviates (if it does) from the criteria. If it appears there are several causes, identify the root cause that the recommendation will resolve.
- **Effect** - the actual or potential consequences of allowing the condition to persist. The audit team should describe either the bad effect if an agency does not implement our recommendation or the good effect that will occur if an agency does implement our recommendation.

Figure 22. Findings Matrix for GAO’s 2016 Report “BEE HEALTH: USDA and EPA Should Take Additional Actions to Address Threats to Bee Populations”

Condition	The U.S. Department of Agriculture and other agencies in the Department of the Interior have funded and conducted separate efforts to monitor native bees. The interagency White House Task Force on Bee Health identified the agencies that will lead and support future native bee monitoring efforts that are intended to document the long-term status of native bees. However, the Task Force did not establish a federal team to coordinate these efforts, identify common monitoring outcomes, methods, and stakeholders who could participate.
Criteria	<p>GAO has identified criteria for how agencies should coordinate their efforts. In March 2000, GAO reported that federal agencies face a range of barriers when they attempt to collaborate with other agencies. (See GAO, Managing for Results: Barriers to Interagency Coordination, GAO/GGD-00-106 (Washington, D.C.: Mar. 29, 2000). Faced with these barriers, federal agencies may carry out programs in a fragmented, uncoordinated way, resulting in a patchwork of programs that can waste scarce funds, confuse and frustrate program customers, and limit the overall effectiveness of the federal effort. In subsequent reports, we identified key practices that can help enhance and sustain collaboration among federal agencies. GAO used some of these key practices as criteria in this review. In particular:</p> <p>Agency staff should work together across agency lines to define and articulate the common federal outcome or purpose they are seeking to achieve that is consistent with their respective agency goals and mission.</p> <p>Collaborating agencies should work together to define and agree on their respective roles and responsibilities, including how the collaborative effort will be led.</p> <p>Collaborating agencies should establishing shared outcomes and goals that resonate with, and are agreed upon, by all participants and are essential to achieving outcomes in interagency groups.</p> <p>Relevant stakeholders should be included in collaborative efforts. This collaboration can include other federal agencies, state and local entities, and private and nonprofit organizations.</p> <p>(GAO sources for key practices: See http://www.gao.gov/products/GAO-06-15; http://www.gao.gov/products/GAO-14-220; and http://www.gao.gov/products/GAO-12-1022</p>
Cause	Officials from the U.S. Department of Agriculture and the Department of the Interior agencies met in 2015 to discuss coordinating their monitoring activities. However, the interagency White House Task Force had not requested that a team be formed to develop and implement a monitoring plan.
Effect	Without a team to coordinate the development of a monitoring plan, Department of Agriculture and Department of the Interior officials said that efforts would likely continue as a patchwork, and they would likely continue to be unable to make conclusions about native bee population trends.

Using this analysis, GAO made the following recommendation to the U.S. Department of Agriculture:

Recommendation: To improve the effectiveness of federal efforts to monitor wild, native bee populations, we recommend that the Secretary of Agriculture, as a co-chair of the White House Pollinator Health Task Force, coordinate with other Task Force agencies that have monitoring responsibilities to develop a mechanism, such as a federal monitoring plan, that would (1) establish roles and responsibilities of lead and support agencies, (2) establish shared outcomes and goals, and (3) obtain input from relevant stakeholders, such as states.

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SDG website for SDG2 Zero Hunger <https://sustainabledevelopment.un.org/sdg2>

WHO website resources www.who.org

Appendix 1

CASE STUDIES

AUDIT CASE 1 - US GOVERNMENT ACCOUNTABILITY OFFICE

Title of the audit

BEE HEALTH: USDA and EPA Should Take Additional Actions to Address Threats to Bee Populations (GAO-16-220)

Importance of the topic

Bees play a vital role in agriculture by pollinating crops that are worth billions of dollars to farmers, while also providing environmental value to other landowners and natural ecosystems by pollinating flowering plants. The health of bee populations, therefore, is important to the nation's well-being. In recent years, beekeepers, farmers, scientists, and others have been increasingly concerned about the health of European honey bees that are commercially managed for honey production and pollination services; other managed bees; and wild, native bees.

In response to direction in a 2014 Presidential memorandum, an interagency task force issued a May 2015 national strategy for protecting bees and other pollinators from a range of possible threats, including pests and pathogens, reduced habitat, lack of nutritional resources, and exposure to pesticides.

Audit objectives/key audit questions

GAO's audit objectives were to (1) evaluate native bee monitoring by the U.S. Department of Agriculture (USDA) and other federal agencies; (2) evaluate the U.S. Environmental Protection Agency's (EPA) efforts to protect bees through its regulation of pesticides; and (3) describe what actions, if any, stakeholders believe the government should take to further promote and protect bee health.

Criteria

Key criteria used by the team included (1) best practices for how agencies should collaborate when working on common objectives such as monitoring and (2) federal laws governing pesticide use.

Scope

The scope of the review included, among other things, federal agencies that conduct monitoring of pollinators and EPA's program for regulating pesticides that could harm bees and other pollinators.

Key Methodologies

Methodologies for the engagement included a review of agency documents, a survey of stakeholders from federal government agencies, academic institutions, the agricultural industry, and the beekeeping industry, and a content analysis of survey responses.

Finding and Recommendation.

Below is information on one of the report's three objectives.

GAO found that the interagency task force directed federal agencies to monitor native bee populations but did not meet criteria that call for agencies to coordinate such efforts. Specifically, the task force did not establish a federal team to coordinate native bee monitoring or identify common monitoring outcomes, methods, and stakeholders who could provide input to the monitoring process. GAO therefore recommended that USDA and other agencies develop a mechanism, such as a federal monitoring plan, that would (1) establish roles and responsibilities of lead and support agencies, (2) establish shared outcomes and goals, and (3) obtain input from relevant stakeholders, such as states. By developing a mechanism, such as a monitoring plan for wild, native bees that establishes agencies' roles and responsibilities, there is better assurance that federal efforts to monitor bee populations will be coordinated and effective.

This audit report is available at <https://www.gao.gov/assets/680/675109.pdf>

AUDIT CASE 2 - US GOVERNMENT ACCOUNTABILITY OFFICE

Title of the audit

FOOD SAFETY AND NUTRITION: FDA Can Build on Existing Efforts to Measure Progress and Implement Key Activities (GAO-18-174)

Importance of the topic

The U.S. Food and Drug Administration (FDA) is responsible for overseeing the safety of about 80 percent of the nation's food supply and for promoting good nutrition. According to FDA, a law enacted in 2011, the FDA Food Safety Modernization Act (FSMA), aims to improve food safety by shifting FDA's focus toward preventing food contamination, rather than responding to foodborne illnesses. GAO was asked to review FDA's food safety and nutrition-related activities and resources since FSMA's enactment.

Audit objectives/key audit questions

GAO's audit objectives were to examine (1) FDA's key food safety and nutrition-related activities since FSMA's enactment in 2011 and how FDA determined its priorities for those activities, (2) the resources FDA dedicated to those activities in fiscal years 2011 through 2016, (3) the extent to which FDA set goals for those activities in fiscal years 2011 through

2017 and is assessing progress toward those goals, and (4) FDA's planned food safety- and nutrition-related activities and associated time frames.

Criteria

The team used a variety of criteria, including Standards for Internal Control in the Federal Government (see GAO-14-704G), leading practices for performance managements, such as those described in Agency Performance Plans: Examples of Practices That Can Improve Usefulness to Decisionmakers (see GAO/GGD/AIMD-99-69), and FDA's own strategic plan.

Scope

The scope of the review focused on FDA activities related to food for humans and feed for livestock animals (animal feed). The team generally excluded activities concerning veterinary medicine or related substances, such as growth hormones or antibiotics.

Key Methodologies

Methodologies for the engagement included reviewing statutes, regulations, and executive orders. The team also analysed a wide variety of FDA documentation, such as budget justifications for Congress, strategic plans, agency guidance documents, and interviewed FDA officials. The team also analysed FDA data on personnel dedicated to food safety and nutrition-related activities from 2011 through 2018 and assessed that data for reliability by, among other things, reviewing FDA's methodology for producing the data and conducting tests to identify obvious errors, outliers, and missing information.

Findings and Recommendations.

Below is information on two of the report's four objectives.

Finding 1 and Recommendation 1: GAO found, among other things, that from the enactment of FSMA in January 2011 through September 2017, FDA had conducted numerous food safety- and nutrition-related activities, determining its priorities for those activities based on statutes and its strategic goals. More specifically, FDA had published 33 proposed or final key regulations and 111 draft or final key guidance documents, focused mainly on food safety. FDA considered multiple factors in deciding between developing regulations or guidance, and its decisions went through multiple reviews. However, the agency did not uniformly document the bases for those decisions. Without uniformly documenting the bases for its decisions for issuing either regulations or guidance related to food safety and nutrition—such as by using concept papers or guidance initiation sheets—FDA cannot ensure consistency and transparency in the decision-making process. GAO therefore recommended that FDA ensure that the Foods and Veterinary Medicine (FVM) Program staff uniformly document the bases for their decisions for issuing either regulations or guidance related to food safety and nutrition, such as by using concept papers or guidance initiation sheets.

Finding 2 and Recommendation 2: GAO found that FDA had identified food safety- and nutrition-related activities that it planned to undertake in fiscal year 2018, but FDA's time frames for such activities in the longer term were unclear. According to FDA officials, the agency planned to pursue the food safety and nutrition strategies identified in the FVM Program's 10-year strategic plan. However, the specific time frames for the activities that would support those strategies were unclear because FDA had not developed a plan that included actions, priorities, and milestones to implement the strategic plan. The strategic plan stated that the FVM Program would develop such an implementation plan,

and FDA officials told GAO that they expected to complete one, but as of January 2018, they had not done so. Until the program completes such an implementation plan, it will be difficult for FDA to ensure it is prioritizing and sequencing the necessary actions to achieve the program's objectives. GAO recommended therefore that FDA complete an implementation plan that includes specific actions, priorities, and milestones for the FVM Program's strategic plan.

This audit report is available at <https://www.gao.gov/products/GAO-18-174>.

AUDIT CASE - SUPREME AUDIT ORGANISATION CZECH REPUBLIC

Title of the Audit:

Funds spent on the projects of the Rural Development Programme

Year of publication or submission:

2015

Period audited:

2010 - 2013

Importance of the topic

The Rural Development Programme is one of the most important subsidies for agriculture, forestry and rural development in our country. The subsidies are used to make agriculture and forestry more competitive, to ameliorate the environment and the countryside or quality of life in rural areas and to diversify the rural economy. Outcomes and results of projects (supported from the Rural Development Programme) should serve not only to farmers, but as well to the local communities in general. We see as important, that the Ministry of Agriculture and other governmental bodies adopted measures to eliminate the shortcomings identified in this audit.

Audit objectives

To scrutinize management of EU funds under the Rural Development Programme and the economy of the Programme, as well as achievement of the purpose and sustainability of the projects under the Programme

Key Audit Questions

- Were the objectives of the Rural Development Programme set correctly and were they met?
- Did the audited projects achieve their purpose and were they sustainable?
- Were the funds (the subsidies) used economically?

Criteria

- Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD)
- Act No. 252/1997 Coll., on agriculture
- Act No. 218/2000 Coll., on budgetary rules and amending certain related acts
- Act No. 137/2006 Coll., on public procurement
- The National Strategic Plan for Rural Development in the Czech Republic (2007-2013)
- Specific Rules on subsidies from the Rural Development Programme for the Czech Republic (2007-2013)

Scope

The Supreme Audit Office Czech Republic (or SAO) scrutinized sample of 120 project financed from the Rural development programme.

Investment projects from following measures were scrutinized:

- I.1. 1. Modernization of agricultural holdings,
- III.1.1 Diversification into non-agricultural activities,
- III.1.2 Support for business creation and development,
- III.1.3 Encouragement of tourism activities,
- III.2.1 Village renewal and development, public amenities and services

Key methodologies

Basic method used was documentary review, interview and on-site audit. Benchmarking was used for evaluation of cost-effectiveness of projects.

Main findings

The Ministry of Agriculture put in place poorly designed conditions for subsidy drawdown, as it made it possible to support projects that in some cases did not contribute to the development of enterprise and in no way served the development of rural areas and agriculture. The conditions for project selection were primarily based on effectiveness or economy. When selecting projects, however, the Ministry of Agriculture in some cases overlooked their effectiveness and did not take into account applicants' real requirements and the quality and subsequent benefit of projects. The SAO's audit conclusion indicated that the Ministry of Agriculture should pay closer attention to defining eligible expenditure in connection with the nature of the measure and the level of the individual outlays done by beneficiaries.

The SAO found shortcomings in control work of the State Agricultural Intervention Fund (or SAIF) when administering subsidy applications and payment applications. The SAO rated the SAIF's control system as partially effective as regards the audited sample of projects. As a result of incorrectly performed control work the SAIF reimbursed beneficiaries for ineligible expenditure worth CZK 8.5 million, which was reported to the relevant financial office as a suspected breach of budgetary discipline. The error rate in the SAIF's control work amounted to 2.28% of the audited volume.

In the case of subsidy beneficiaries, it was found that two of them did not conserve the project outcomes throughout the sustainability period and one beneficiary was reimbursed for a significantly greater quantity of building material than could have been used in reality and for other building material than that invoiced.

Recommendations

The SAO recommended that the Ministry of Agriculture modify the subsidy conditions for the 2014-2020 programming period so that they enabled the selection of high-quality and beneficial projects that would support rural development and so that the risks of uneconomical and inefficient use of public money and its misuse by beneficiaries were minimised.

Based on the audit conclusion from this audit, the Ministry of Agriculture and the State Agricultural Intervention Fund adopted measures to eliminate the identified shortcomings, including deadlines for their execution. The adopted measures are mainly systemic and relate to the 2014-2020 programming period. The measures largely concern changes in the rules for providing subsidies out of Rural Development Programme 2014 – 2020 in the sense of abolishing certain measures and certain specific conditions. Other changes are intended to help improve the assessment of practicality, necessity and effectiveness when selecting projects, the limits on eligible expenditure, public procurement conditions and penalties.

AUDIT CASE - SUPREME AUDIT INSTITUTION OF ECUADOR

Title of the audit

Audit of environmental aspects to the Preparation of the National Government, for the implementation of the Sustainable Development Goals (SDG), in the complete form regarding the conformation of the Government Centre and in the specific manner for Goal 4 of Objective 2, regarding sustainable food production systems; Based on the components of governance and public policies, a burden of the National Secretariat of Planning and Design (SENPLADES) and other State entities, for the period between September 25, 2015 and June 30, 2017

Year of publication

Report DNA1-0027-2018, approved on April 13, 2018

Importance of the subject

The Sustainable Development Goals (SDGs) of the UN 2030 Agenda are a global effort to solve the great problems of humanity, within a framework more ambitious than that of its predecessors, the Millennium Development Goals. These objectives allow for their assessment not only vertically with their own indicators, but also tending to the transversality of the interrelation between the SDGs.

Objectives of the audit

- Evaluate the preparation of the Government for the implementation of the sustainable development objectives, in terms of the formation, operation of the centre of government, the articulation of institutions and public policies.

- Analyse the governance strategy of the National Government in preparation for compliance with Goal 2.4, in terms of its internalization, coordination, monitoring, evaluation and communication.

Key questions

1. Mapping of Attributions, refers to the institutions of the Executive Function of the State, considered as “center of government”, and its degree of organization which will allow the National Government, as beneficiary of the audit, to establish actions aimed at institutionalization of the 2030 Agenda (UN, 2015).
2. Governance Scale, referring to the actions of preparation for the implementation of the Sustainable Development Goals.
3. FSD analysis, fragmentations, overlaps, duplications and absences were identified in the main public policies, as well as the negative and positive effects of this policy relationship.

Audit Criteria

- Constitution of the Republic of Ecuador, 2008
- Organic Code of Planning and Public Finance, 2010.
- Organic Law of Popular and Solidarity Economy, 2011
- Organic Law on Transparency and Access to Public Information, 2004.
- Organic Code of Territorial Organization, Autonomy and Decentralization, 2010
- Goal 4 of SDG 2

Scope of the audit

The audit considered the preparation of the National Government, for the implementation of the Sustainable Development Goals (SDG), regarding the conformation of the Government Center and specifically for Goal 4 of Objective 2, referring to sustainable production systems foods; based on the components of governance and public policy, by the NATIONAL SECRETARIAT OF PLANNING AND DEVELOPMENT (SENPLADES) and other State entities.

The related institutions, which were evaluated in this control action are:

- Vice President of the Republic
- National Secretariat of the Public Administration
- National Secretariat for Policy Management
- National Water Secretariat
- Secretariat of Higher Education, Science, Technology and Innovation
- Ministry of Foreign Affairs and Human Mobility
- Ministry of Agriculture and Livestock
- Ministry of Social Welfare

- Ministry of Public Health
- Ministry of Education
- National Institute of Statistics and Census

The control action was framed in the “Coordinated Audit in the Preparation for the implementation of the Sustainable Development Goals in Latin America”, executed in several countries, organized by the Special Technical Commission on the Environment - COMTEMA, of the Latin American Organization and of the Caribbean of Supreme Audit Institutions - OLACEFS.

Methodology

The compatibility of the structure and articulation of the Executive Function as a center of government, the competencies and the corresponding legal framework for the implementation of the 2030 Agenda of the Sustainable Development Goals (ODS) was evaluated.

In addition, emblematic policies, programs and interventions related to goal 4 of Objective 2 of the 2030 Agenda were evaluated to diagnose the level of internalization, coordination, monitoring, evaluation and communication, planned and in execution, of these activities.

Main findings

Preparation for the Implementation of Sustainable Development Objectives

The National Development Plan establishes a mapping of policies, goals and responsibilities; there are reports from the National Secretariat of Planning and Development, which determined specific relationships with the Sustainable Development Goals contained in the 2030 Agenda.

The 100% correlation with the objectives was determined; and an agreement of 41.42% of the goals of the 2030 Agenda and the National Development Plan, having correlation in 61 of 161 SDG targets; however, there was no evidence of institutions responsible for monitoring and evaluating the implementation of the SDGs and their corresponding goals.

Preparation for the Implementation of Goal 4 of Sustainable Development Objective 2

The National Development Plan proposes 9 national objectives, structured around three axes: 1. “Rights for all throughout life”, 2. “Economy at the service of society”, and 3. “More Society, better State”

The second axis, “Economy at the service of society”, contains the sixth national objective, called “Developing productive and environmental capacities to achieve food sovereignty and integral rural development”, which groups and aligns 6 policies related to production of food, coordinating the actions of each policy in “emblematic interventions”, as is the case of the “Minga Agropecuaria”. This national objective has a theme related to objective 2 of the 2030 agenda of Sustainable Development.

Risk of affecting the government management model in aspects of food production and productivity through environmentally friendly resilient practices

Social conditions for agricultural workers

The management models proposed in the National Development Plan 2017 - 2021 (goal 4.3: Promote the population's access to credit and services of the national financial system and promote financial inclusion in a framework of sustainable development, solidarity and territorial equity) and the emblematic intervention "Minga Nacional Agropecuaria" establishes the participation of the State in the granting of microcredit for individual, family, community and SME productive units through public banking, aimed at improving the financing conditions of individual and family agricultural workers.; and, by including associative programs, look for the step of subsistence agriculture to the generation of resources as the main economic activity of the target population.

The implementation of these policies becomes essential in the national socioeconomic reality, marked by the smallholding, as reflected in the "Survey of Area and Continuous Agricultural Production ESPAC2017", issued by the National Institute of Statistics and Census indicating that 73.80% of the people were engaged in agricultural work without remuneration (the producer and their families); 13.59% corresponded to permanent paid workers and 12.61% to occasional workers.

In the social dimension the participation or representation of agricultural workers in the decision-making process in public policies should also be considered, being the responsibility of the State to ensure access and participation of agricultural workers, according to their representativeness, as it was planned in goal 7.1 of the National Development Plan (Consolidate citizen participation in the cycle of public policies and social control mechanisms).

The risk generated by the incomplete or null implementation of these actions considered in national planning is the perpetuation of the cycle of poverty and the deterioration of farmers' socioeconomic conditions.

Water management conditions in agricultural production

The management model proposed in the National Development Plan 2017 - 2021 (goal 5.5 Promote the productivity, competitiveness and quality of primary products and the availability of related services and other inputs, to develop the agricultural, livestock, aquaculture and fisheries industry, with a focus on satisfying national and export demand) and the "Irrigation" program of the emblematic intervention "Minga Nacional Agropecuaria", provide the political framework for the plans and programs of watershed management and irrigation management.

There is a risk regarding the coordination between the entity regulating the use of water resources (National Water Secretariat - SENAGUA) and the executors of projects for the use and distribution of irrigation water (Ministry of Agriculture and Livestock, SENAGUA and Provincial government level), which depends to a large extent on the normative, planning and operative capacity of the state regulator.

Management conditions related to the diversification of agriculture, and its relationship with nutrition - food security

The management model proposed in the National Development Plan 2017 - 2021 (goal 2.3 Promote the rescue, recognition, research and protection of cultural heritage, ancestral knowledge, world views and cultural dynamics) that, if implemented, will provide a framework for public policies, and manage resources for the protection of biodiversity in crops, recognition of ancestral knowledge and plant varieties with nutritional potential. Progress was shown in the implementation of the integral strategy for the conservation and use of underutilized agrobiodiversity in Latin America (LATINCROP) with the support of the European Union. Also, Ecuador has since 1959 the National Institute of Agricultural Research, which performs the functions of development of agricultural technologies, plant breeding to increase the resilience of the plant species harvested, according to the

conditions of cultivation in the country and the maintenance of the bank germplasm that ensures the conservation of native species and varieties of the country.

The deficiencies in the implementation of the programs related to this purpose, of the National Development Plan will limit the progress of these initiatives; and, in addition, they can prevent the socialization of this knowledge.

Recommendations

1. Strengthen the institutionalization process and internalisation of the SDGs in Ecuador and defining a formal plan or strategy for the Institutionalization of the SDGs and the 2030 Agenda, considering activities, responsibilities, products and deadlines.
2. To formally establish the entities responsible for the coordination and application of the 2030 Agenda, clearly assigning the attributions and responsibilities of the different actors and levels of government.

AUDIT CASE - NATIONAL AUDIT OFFICE OF CHINA

Title of Audit

Audit to Promote Accurate Identification of Poverty with Multi-dimensional Big Data Analysis

Year of publication or submission

2017

Period audited

October to December 2016

Importance of the topic

Accurate identification of poverty population is the fundamental work of China's poverty alleviation and countryside development projects. Through accurate identification, the target population to households and the specific causes of poverty are determined. With the information collection and identification of poor households, a national poverty alleviation and countryside development information system has been set up to effectively earmark the target population.

Audit objectives

Focus on the basic strategy of accurate poverty alleviation while highlighting the key points of "accuracy". With the help of multi-dimensional Big Data comparative analysis, this audit centers on the authenticity and accuracy of the data from local archives. Suspicious clues found in the audit are provided to the local government departments for verification.

Key questions

- Whether the information of poor households is accurate and complete, and

- whether there are any recipients who do not meet the requirements to be included in the information system.

Criteria

Take one household as the unit, if the average per capita net income of every member of this household is lower than the national countryside poverty alleviation standard, it is recognized as a poor household (2300 Yuan as by the year 2010). According to varying local standards, in some places if the household buys a house or a car, it shall not be identified as a poverty household.

Scope

Centering on the data of poor households, collect the data of vehicle purchase ..

Key methodologies

Comparison and analysis of multi-sectoral data

Main findings

Through data comparison and analysis, it is found that some poor households buy at least one vehicle, some are even luxury cars; some registered poor households buy real estate in provincial capitals, and some even have large-area, high-value real estate.

Recommendations

The audit team provide clues to the local poverty alleviation departments, and the local departments verify and confirm the clues one by one, taking into account the living conditions, family property, and the causes of poverty as a whole. Those who do not meet the requirements are excluded from the support list from the information system. Poverty alleviation funds that have been illegally distributed are recovered. The audit has improved the accuracy of the implementation of poverty alleviation policies and measures.

AUDIT CASE - NATIONAL AUDIT OFFICE OF ESTONIA

Title of the Audit

State activities in securing food safety

Year of publication or submission

2019

Period audited

2010-2018

Importance of the topic

The use of pesticides and fertilizers in agriculture is rising, thus creating concerns over the chemical contamination of food. Research suggests that many illnesses, allergies or other health problems may be attributed to chemicals in food.

Audit objectives:

To assess, whether the activities carried out by the state help securing the food safety and protection of health.

Key Audit Questions

1. Do the activities carried out by the state allow securing food safety and react adequately to safety concerns?
2. Do the government bodies publish the results of research on food-safety and do they raise systematically the public awareness, so the people could make knowledgeable choices?

Criteria

- Ministry of Rural Affairs and the National Food Board have mapped the risks related to food-safety and the activities for reducing these risks;
- The National Food Board has the capacity to inspect all aspects of food safety from growing the produce until the produce reaching consumers;
- The National Food Board monitors and analyses food enough to enable making conclusions on general food safety;
- Food laboratories can detect all relevant chemicals;
- The National Food Board knows about the dangerous food that has reached the market and intervenes effectively, eliminating the produce from the market;
- Public has access to relevant information on food – monitoring results, research, food analysis, enabling the public to make healthy food choices.

Scope

The audit was focused on pesticide and fertiliser residues in food and food-additives. Food-safety issues are heavily regulated by EU directives, regulations and decisions, so the criteria were derived from these requirements.

Key methodologies

Do the government authorities have an overview of food-related risks and can manage them? – analysis of EU and Estonia's legal acts, European Food Safety Authority research, Food Board risk assessments and action plans, queries to relevant authorities, academic research on food safety, statistics on food safety, interviews, analysis of the controls-database of the Food Board.

Does the monitoring and inspections by the Food Board secure that relevant proportion of chemicals in food are detected? – analysis of legal acts of EU and Estonia, control plans of the Food Board, monitoring plans of the Food Board, monitoring reports of the Food Board, EFSA reports, EU and Estonia’s pesticide registries, sample analysis of the controls-database of the Food Board, queries to the relevant laboratories, monitoring reports of Estonia and EFSA, sample testing of 10 food items by the NAO Estonia, interviews.

Does the government provide enough information for the food producers and for consumers? – media analysis, analysis of web-sites of relevant authorities, queries to the auditees, research reports on the most relevant sources of information for the consumers, analysis of the EU Rapid Alert System of Food Safety, interviews, sample testing of correct labelling of food products (conducted by the employees of NAO Estonia).

Main findings

Audit is not finalised yet. Expected publishing date is in April 2019.

Recommendations

Audit is not finalised yet. Expected publishing date is in April 2019.

AUDIT CASE - NATIONAL AUDIT OFFICE OF BULGARIA

Title of the audit

Development, monitoring and control on the production and trade with organic foods and products.

Importance of the topic

Over the recent years, the pursuit of a healthy lifestyle and the interest towards organic foods has been growing continuously. Towards this background the Bulgarian National Audit Office performed the audit “Development, monitoring and control on the production and trade with organic foods and products” in 2017.

Audit objectives/key audit questions

The main aim of the audit was to provide an independent and objective assessment of the effectiveness of the control and monitoring mechanism for the production and trade in organic foods, as well as to give recommendations to ensure the better protection of consumer interests. The key audit question was: Are the interests of consumers of organic foods and products in Bulgaria safeguarded?

Criteria

- Council Regulation (EC) No 834/2007 of 28 June 2007
- Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004
- Commission Regulation (EC) No 889/2008 of 5 September 2008

- Law on the Implementation of the Common Organization of European Union Markets;
- Ordinance 1 of 7 February 2013 on the implementation of the rules on the organic production of plants, animals and aquacultures, plant, animal and aquaculture products and foods, their labelling and the control on their production and labelling.

Scope

During the audit, the processes on the issuance and revocation of control action permits to monitor the compliance with organic food production rules were analyzed. The efficiency of the controllers' monitoring process was evaluated. The control on organic foods placed on the market, in the mass caterers and on the Internet was assessed. The effectiveness of communication between the Ministry of Agriculture, Food and Forestry, the Bulgarian Food Safety Agency and the controllers in case of irregularities and infringements of organic production rules was also assessed.

Key Methodologies

To achieve the audit's objectives, both standard and specific methods for collecting and analysing information were used – for example, "Secret customer". As a result, it was established that an organic product certified by a controller whose license had been revoked was placed on the market.

Findings and Recommendations

The main audit finding was that the control and monitoring system on the production and trade with organic foods was ineffective, and that consumer interests were not safeguarded to a sufficient extent.

Due to the lack of a relevant legislative framework, no control on organic foods and products offered in mass caterers and on the Internet was taking place. Because of the regulatory gaps, public health risk management and consumer protection was solely the responsibility of the providers of these products. Due to established weaknesses in the national legislation, information on all retail establishments that offered organic agricultural foods and products was missing. The lack of data hindered the effective planning and actual control on commercially available organic foods.

The system of issuance of control action permits to monitor the compliance with organic food production rules needs to be significantly improved in order to be effective. The supervision of controllers could also be described as ineffective, since: the planning of supervisory examinations is not adequate and the key opportunities to perform additional unexpected control are not used; no conditions for objectively assessing the controllers' activities have been established – for example, the lack of clear and objective definitions on assessment creates the possibility for a differentiated approach;

significant omissions exist as regards the adequacy and traceability of supervisory examinations; the supervisory control is limited by the existing legislation to up to 1% of dossiers of operators that have signed a contract with controllers.

Another major weakness is that consumers are not well informed about the requirements for labelling and indication of organic foods, as well as how to identify them.

When presenting the audit results to the general public, the Bulgarian National Audit Office organized an information campaign on the main requirements for labelling organic foods and the ways to identify them.

Following the conclusion of the audit, 18 recommendations were given to the Minister of Agriculture, Food and Forestry and the Executive Director of the Bulgarian Food Safety Agency.

This audit report is available at:

<http://www.bulnao.government.bg/bg/articles/smetnata-palata-kontrolyt-vyrhu-biohrani-i-produkti-u-nas-ne-zashtitava-dobre-interesite-na-potrebitelite-1931>

Appendix 2

HOW TO IDENTIFY THE ELEMENTS, CONDITIONS OR VARIABLES ASSOCIATED WITH EACH PHASE OF THE PRODUCTION CHAIN

In each of the phases of the production chain, there is a set of elements, conditions or variables that can directly affect the nature of the food. Of this set of elements, some of them, called critical factors, require permanent control, since they can disturb the phase or phases of the production chain, altering the conditions of the food, affecting the health of people and generating economic impacts to the population, producers, manufacturers and the state.

Next, the elements, conditions or variables, associated to each phase of the productive chain, are described, which can be classified as critical factors, according to the regulations and the conditions of each country (Table 1).

Table 1. Main elements, conditions or variables

Phase	Elements, conditions or variables
Primary Production	Soil management
	Water use
	Access to irrigation
	Utilization/Usage of parcel irrigation
	Irrigation method adapted to the product
	Water quality
	Origin of water
	Regulations to standardize irrigation systems
	Productivity vs Irrigation method
	Use of chemical and biological products
Supplies used in irrigation	

Harvest	Quality of disinfectants
	Used materials
	Techniques used
	Strange element or contaminants
	Drying temperature
	Seasonality of products
	Documentary record
	Post-harvest process
	Farm Equipment
	Harvest management
Fabrication	Factory maintenance
	Machinery used
	Industrial Security
	Supplier control
	Good manufacturing practices
	Safety
	Technical standards and regulations
	Control of Certifications
	Labor conditions
	Water quality
	Microbiological analysis of the raw material, semi-finished and finished product
	Food Additives
	Physical-chemical controls
	Statistics assessment
	Water treatment systems
	Raw material
Traceability	
Personal hygiene	
Pest Control	
Packaging	Packaging quality
	Presence of foreign elements and contaminants
	Use of materials
	Biodegradable packaging
	Preservation
	Used materials
	Labeled
	Documentary record
Raw materials with which the packaging is made	

Storage or Conservation	Transfer of heavy metals and contaminants
	Post-harvest techniques (primary production)
	Presence of foreign elements and microbiological contaminants
	Refrigeration techniques
	Inputs used for conservation
	Storage
	Conditions of the collection center
	Variation of temperatures and storage times
Distribution	Presence of physical, chemical and microbiological contaminants
	Appropriate transportation
	Absence of dealer control
	Type of conservation
	Distribution channels
	Agricultural marketing
	Mobilization guides
Fair trade intermediaries	
Consumption	Access to national market
	Access to international markets
	Permits or health records
	Competition and market power
	Contraband control
	Consumer rights
	Control of finished product on hanger
	Sanitary control
	Socialization of consumption standards
	Food sovereignty
	Normative
	Promotion of healthy food consumption
Misleading advertising	



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