



**MAFF**  
Ministry of Agriculture,  
Forestry and Fisheries



**Report  
On  
Project for Supporting Agricultural Survey  
On Promoting Sustainable Agriculture (SAS-PSA) in ASEAN Region  
(Cambodia)**

**Submitted by  
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# Chapter 1 Introduction

## 1.1 Background

The Sustainable Development is a multi-dimensional concept in all global development initiatives. The concept highlights the economic growth, social developments, and environmental protection for future generations. In 2015, the Sustainable Development Goals (SDGs) are ratified as a universal call to end poverty, protect the planet and promote peace and prosperity to everyone by the year 2030. In order to reach the goals and targets in a 15-years plan as a part of the 2030 Agenda for Sustainable Development (Agenda 2030), the UN Member States adopted the 17 Sustainable Development Goals, accordingly. They are (1) No Poverty, (2) Zero Hunger, (3) Good Health and Well-being, (4) Quality Education, (5) Gender Equality, (6) Clean Water and Sanitation, (7) Affordable and Clean Energy, (8) Decent Work and Economic Growth, (9) Industry, Innovation and Infrastructure, (10) Reducing Inequality, (11) Sustainable Cities and Communities, (12) Responsible Consumption and Production, (13) Climate Action, (14) Life Below Water, (15) Life On Land, (16) Peace, Justice, and Strong Institutions, (17) Partnerships for the Goals.

SDG indicator 2.4.1 Proportion of Agricultural Area under Productive and Sustainable Agriculture measures the three distinct dimensions of sustainability: environmental, economic, and social. It observes 11 themes on land productivity, profitability, resilience, soil health, water use, fertilizer pollution risk, pesticide risk, biodiversity, decent work, food security, and land tenure. However, a recent prominent report suggested that one of the most urgent targets was SDG indicator 2.4.1 (Chon et al, 2018). In order to improve this target, Department of Planning and Statistic (DPS), Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia is in collaboration with the ASEAN Food Security Information System Secretariat (AFSIS) to implement the Project for Supporting Agricultural Survey on Promoting Sustainable Agriculture in ASEAN Region (SAS-PSA) for the achievement of SDGs indicator 2.4.1. This project will develop the method for data collection using reliable statistics to tackle agricultural productivity improvement and promotion of agricultural sustainability and the required results will be implemented as substantiating data for decision making. This project, therefore, will support and strengthen the AFSIS's activities which contribute to monitoring the food security situation throughout the ASEAN region for providing accurate and comparable agricultural statistics data collection using a unified survey method. AFSIS Secretariat will be responsible for the implementation of the Project for Supporting Agricultural Survey on Promoting Sustainable Agriculture in ASEAN Region (SAS-PSA) with the main purpose of supporting and promoting sustainable agriculture on SDG indicator 2.4.1. The candidate countries were agreed by AFSIS Focal Points on the 18th AFSIS Focal Point Meeting (held on June 8, 2020) that Thailand, Laos and Cambodia will be target countries to implement the SAS-PSA project in 2020-2022.

## 1.2 Objectives

- to develop an appropriate survey method for data collection related to SDG indicator 2.4.1.
- to analyze and to understand the SDG indicator 2.4.1.
- to conduct a pilot survey in a sub-national area.

### 1.3 Scope of Study

The scope of this study is to raise the capacity of the technical staff in DPS/MAFF to understand the concept and methodology of SDG indicator 2.4.1 from three dimensions to be covered indicator 2.4.1 includes environmental, economic, and social dimensions in the sustainability assessment, the 11 themes within each dimension, and a sub-indicator for each theme by conducted a pilot survey in three districts namely Banan, Thma Koul and Bavel in Battambang Province. The scope of indicator 2.4.1 is the agricultural farm holding, and more precisely the agricultural land area of the farm holding, i.e., land used primarily to grow crops and raise livestock. Forestry, fisheries and aquaculture activities may be included to the extent that they are secondary activities conducted on the agricultural area of the farm holding.

### 1.4 Period of Study

Starting from 1<sup>st</sup> September, 2021 to 8<sup>th</sup> July, 2022 (11 months)

### 1.5 Definition of Terms

- Project for Supporting Agricultural Survey on Promoting Sustainable Agriculture in ASEAN Region (SAS-PSA) is known as the project which is advocated by the Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan through the AFSIS project for supporting and promoting sustainable agriculture under SDG indicator 2.4.1 during 2020 – 2022.
- Corona virus (COVID-19), according to the World Health Organization (WHO), is an infectious disease caused by a newly discovered corona virus.
- There are some main definitions *details in Annex 2 Enumerator Manual*

### 1.6 Methodology

- This survey was conducted based on the guideline from FAO's SDG 2.4.1 Methodological note. The details attached in annex 3 SDG 2.4.1 Methodological note.
- Data Source Type: this research uses two sources of data: 1) quantitative data is analyzed using calculable statistical methods; 2) qualitative data is expressed through descriptive analysis and categorization.
- Data Collection Method:
  - 1) The study employs the paper-based survey and Computer-Assisted Personal Interviews (CAPI) using SDG 2.4.1 questions based on FAO questionnaire as a research instrument. This questionnaire has been rectified and associated with agricultural practices in ASEAN and both questionnaire and enumerator manual were translated from English into Khmer.
  - 2) Sampling frame for data collection is predicated from list year 2021 of District Agriculture Office (DAO) under the Provincial Department of Agriculture, Forestry and Fisheries, Cambodia (PDAFF). The planned sample size is 220 samples.
  - 3) After acquiring the sample size, the data collection conducts via personal interview using a simple random sampling method.
  - 4) For data analysis process, the data is evaluated by analysts using statistical techniques via Microsoft Excel and R program.

- SDG indicator 2.4.1 Proportion of Agricultural Area under Productive and Sustainable Agriculture captures 3 dimensions of sustainable production: Economic, Environmental, and social dimension. FAO initiated a process of methodological development that involved 11 themes and sub-indicators. These sub-indicators for tackling the SDG indicator 2.4.1 are as follows;

**Figure 1** three dimensions of sustainable production: Economic, Environmental, and Social

Dimensions	No	Theme	Sub-Indicator
Economic	1	Land productivity	Farm output value per hectare
	2	Profitability	Net farm income
	3	Resilience	Risk mitigation mechanisms
Environmental	4	Soil health	Prevalence of soil degradation
	5	Water use	Variation in water availability
	6	Fertilizer pollution risk	Management of fertilizers
	7	Pesticide risk	Management of pesticides
	8	Biodiversity	Use of agro-biodiversity-supportive practices
Social	9	Decent employment	Wage rate in agriculture
	10	Food security	Food insecurity experience scale (FIES)
	11	Land tenure	Secure tenure rights to land

*Note.* The table is reprinted from SDG indicator 2.4.1 – Proportion of agricultural area under productive and sustainable agriculture, by FAO, 2020.

In this study, the sustainability criteria and thresholds will be applied which the results of each sub-indicator are presented as Desirable (green), Acceptable (yellow), and Unsustainable (red).



## 1.7 Outcomes

- The SAS-PSA project is very useful and helpful for national and sub-national especially, DPS team, because it helps to increase the capacity of technical staff to understand the concept and methodology of SDG indicator 2.4.1 as well as an appropriate survey method to collect data related to SDG indicator 2.4.1 for extending the survey to other provinces in the future.
- Supporting data for academic and policy making communities and sharing experiences on the agricultural survey to all stakeholders.
- Presentation and publication of the empirical results of the survey will be presented in the relevant meetings and published on the AFSIS website.
- This reliable statistics data which is available, accessible, transparent, and used for supremacy decision making is essential for the successful implementation of Agenda 2030

## Chapter 2 Rationale of the project

### 2.1 Background of Cambodia

Cambodia Bordered by Thailand, Laos and Vietnam to the west, north and east, Cambodia's four main topographical features are expansive plains, the great Tonle Sap Lake region, coastal areas abutting the Gulf of Thailand, as well as mountains, hills and highland plateaus. 25 provinces and the municipality of Phnom Penh. Below the provincial and municipal level, the country is composed of three administrative units, with the smallest unit of administration defined as the village, followed by the commune and district. The total 14,545 villages are clustered within 1,409 communes which are grouped within 163 districts. Population is 15,552,211. This is the population the total de facto population increased from a total of 13,395,682, in the 2008 Census. Thus, the population has grown by 2,156,529 persons, which represents 16.1 percent, over the 11-year period from 2008 to 2019. The male population was 7,571,837 (48.7 percent), while the female population stood at 7,980,374 (51.3 percent) that 6,135,194 people living in Urban and show that the population density of Cambodia was 87 persons per km<sup>2</sup> in 2019 this is an increase of 12 persons, compared to the 75 persons per km<sup>2</sup> recorded in 2008. (GPCC 2019)



**Figure 1:** Map of Cambodia. (DPS team, 2021)

#### 2.1.1 Agricultural Strategic Development Plan (ASDP)

The Royal Government of Cambodia sets out the Rectangular Strategy Phase-IV and the National Strategic Development Plan 2019-2023 to strengthen necessary pre-condition and support environment to the deep reform of Cambodia aiming to fully achieve sustainable development goal,



particularly, to achieve the Vision of Cambodia becoming as a high-medium level income country in 2030 and high-income country in 2050. The Rectangular Strategy Phase IV focuses strongly on enhancing productivity and competitiveness, reforming and economic diversification in high value-added activities.

This vision can only be realized by exploiting country's potential to promote Agriculture sector the Ministry of Agriculture, Forestry and Fisheries (MAFF) launched 5-year strategic development plan for agricultural sector 2019-2023. This development plan aims to improve farming and agricultural sector through modernizing the agricultural practices to become more competitive, increase productivity, diversify export and commercialization (MAFF, 2019) A 5-Year ASDP sets out the clear vision, goal, objectives, target indicators, and strategies to be undertaken which it is a main basic for decision-making on the utilization of human resource, budget, equipment, means, and potentials in Cambodia through integration of proper agricultural technologies (such crops planting, animal raising, market -driven agricultural products linkage, and processing), institutional enhancement, increasing effective support service, and human resource development. Agricultural sector is still playing an important role in promoting the economic, social and rural development, especially poverty alleviation in Cambodia. Due to the economic development and increases in production, the two priority strategic targets set out for the development of agricultural sector are such; (i) promoting agricultural productivity, diversification, competitiveness and commercialization and (ii) increasing the effectiveness of sustainable management and development of forest and fish resources. To achieve the above priority policy goals, main five strategies will be rolled out over the next five years:

- 1) Increase crops productivity, diversification and expand agribusiness
- 2) Promote animal health and commercial animal productions
- 3) Strengthen the management and development of sustainable fish resources
- 4) Strengthen sustainable management and development of forest and wildlife resource
- 5) Increase the effectiveness of institutional management, support services and human resource development

### **2.1.2 Share of Agriculture sector to Cambodia's economy**

Agriculture sector remains one of the lead sectors which contribute to the national economic growth, and also contribute to growth of the national product and income obtaining from agricultural product exportation. The agriculture sector provides job employment and income to people who living in rural area and occupied by agriculture.

The government has realistically achieved some key indicators of the macro-economic framework by acquiring over 7% of annual economic growth and retaining 3% of the low inflation rate. In 2018, the evaluation of Cambodian economic show that Cambodia was still strong economic nation with 7.5% of economic growth.

In recent years, Cambodia has experienced the significant changes of economic structure that impact the whole economy. The share of the industrial sector in the whole GDP has seen increase in the decade. However, agricultural sector is still the primary source of production and employment.

Figure 2 shows the contribution of manufacturing and agriculture share of GDP in Cambodia’s economy. Agriculture accounts for 22%, estimated 5.3 billion USD of total GDP, and employed up to 30.8% of the total employment in Cambodia. However, the contribution to export of agricultural commodities is about 6.5%. As a result, there is room for improvement in this category through increasing the industrial value add in order to integrate into the global supply chain through harnessing the power of STI. In addition, industry sector contributed about 34.7% of GDP, while service sector contributed about 36.2% of GDP in 2020 (MAFF, 2021).

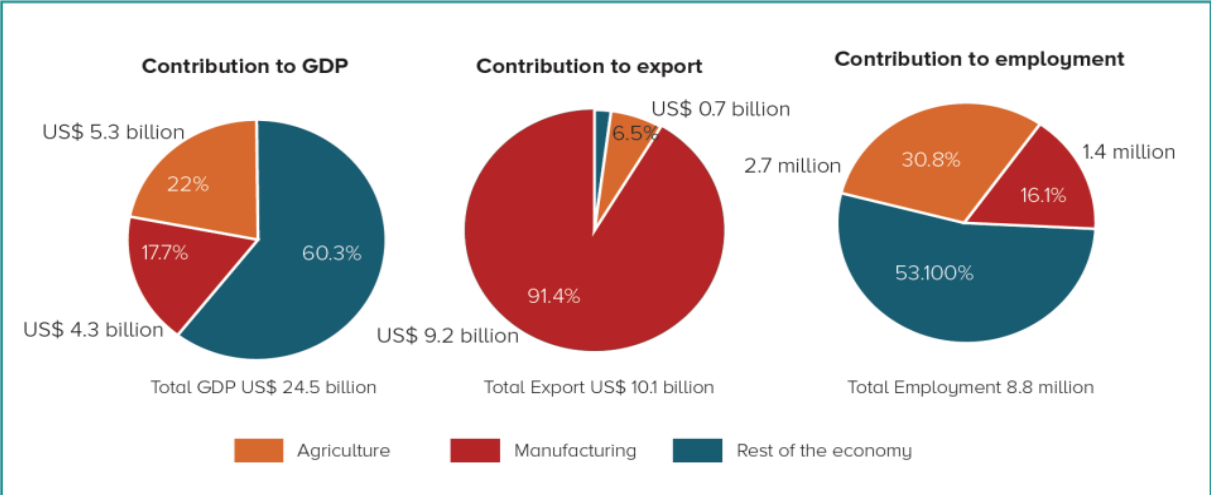


Figure 2: Contribution to GDP of Agriculture and Manufacturing. (UNDP, 2020)

2.1.3 Value of agricultural exports by categories

Figure 3 indicates that the total value of agricultural exports increases more than tripled since 2010. The majority of the country’s agriculture exports remains in raw form and mainly dependent on crops. The major export products are rice and rubber, with some increasing share of cassava. From 2010 to 2018, the biggest reduction of export value was seen in maize (ADB, 2021).

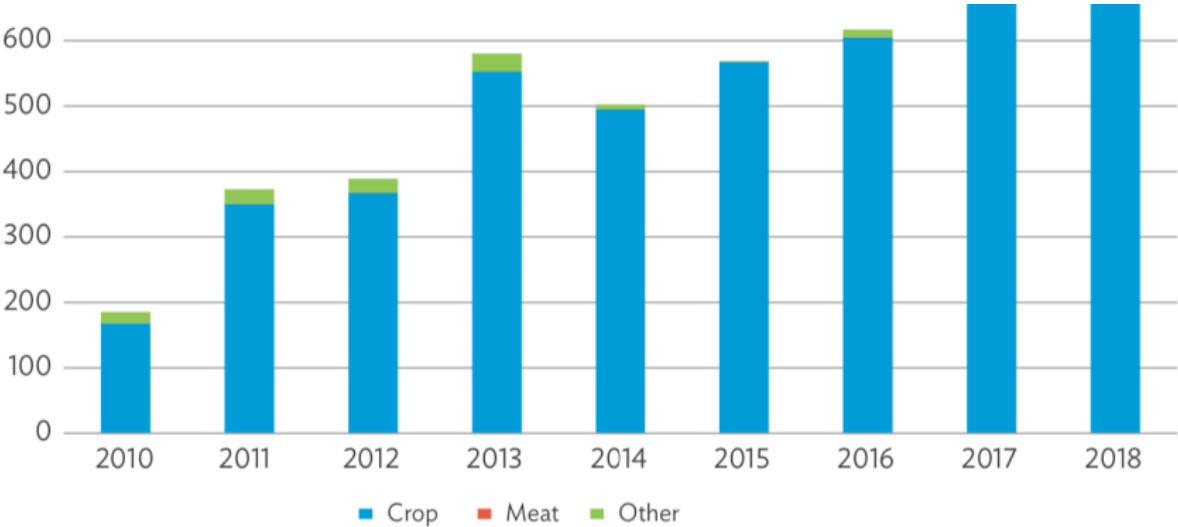
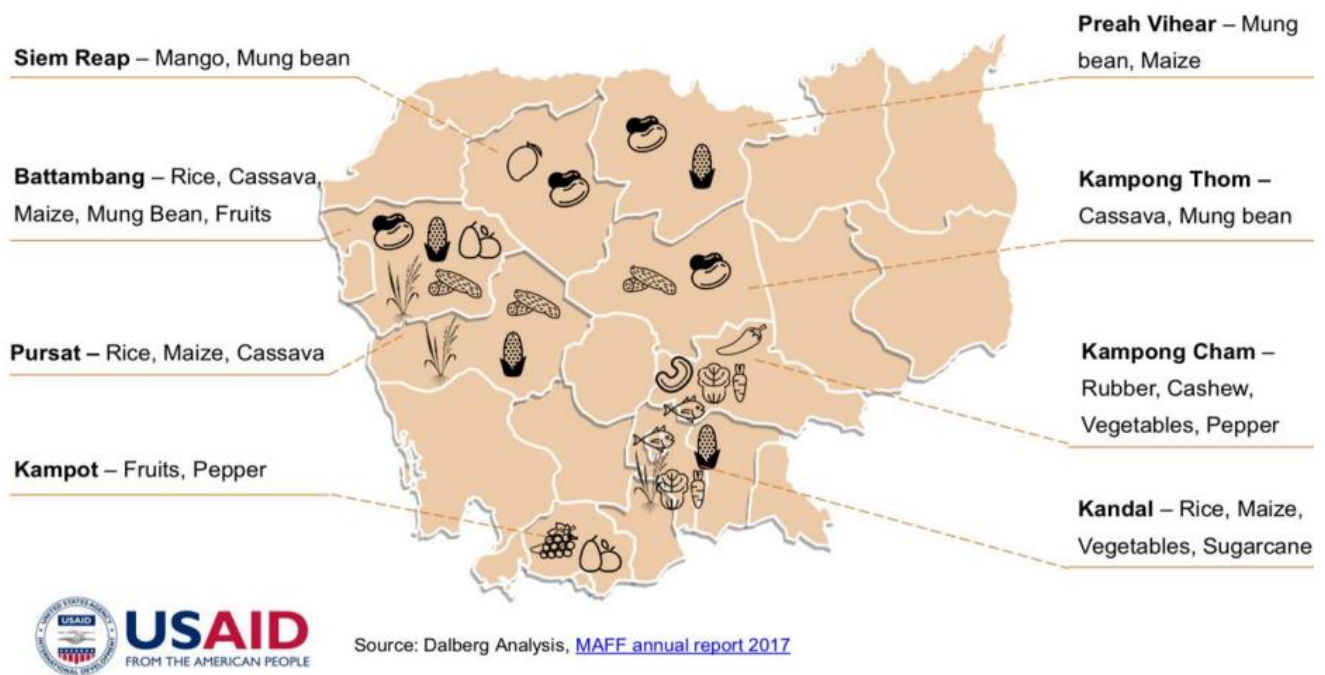


Figure 3: Value of agricultural exports 2010-2018 (million USD)



## 2.1.4 Potential agriculture commodities

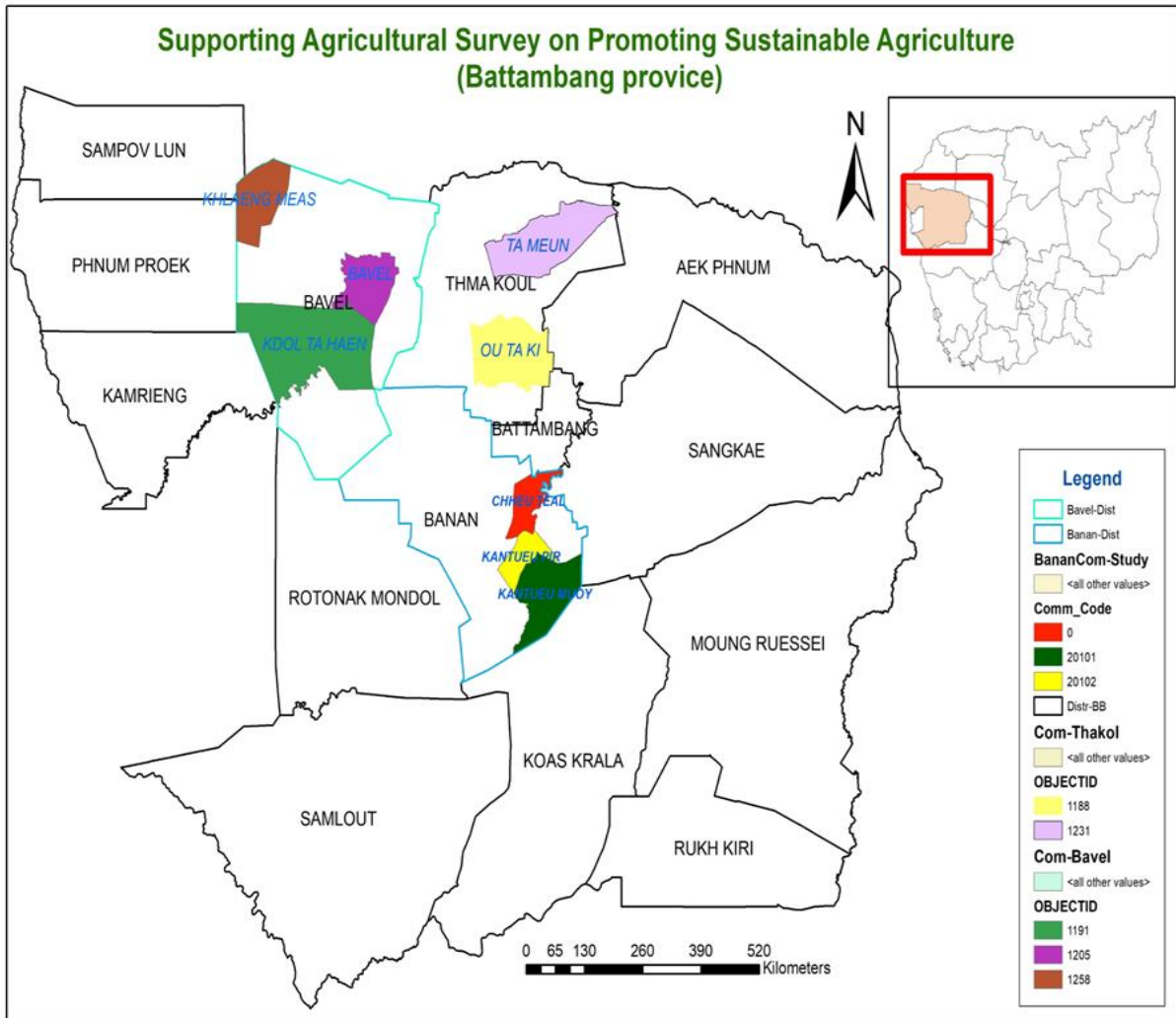


**Figure 4:** Province around Tonle sap and the Mekong basin account for the bulk of production. (USAID, 2019)

Cambodia has prioritized six commodities for domestic market and export. The in-depth studies of these value chains needed to be conducted to have a better understanding of market opportunities, supply constraints, risks and threats faced by smallholder farmers, entrepreneurs and consumers, as well as of opportunities to support socio-economic development and sustainable development goals. The six prioritized commodities are mango (Keo Romeat), cashew, maize (red corn), cabbage, pig, and chicken. They are considered as strategically important for food security and nutrition, and for their potential contribution to decent employment and reduction of rural poverty (FAO, 2021). In addition, according to the 2019 final report of USAID on Cambodia Agriculture Competitiveness Opportunity assessment, about 3 million people are engaged in agriculture production, earning an average of about 1200 USD per year. Most farmer are smallholders with an average landholding of approximately 1.2 hectares. 66% of farmer own less than 1.6 hectares of land, about 20% of farmer own 1.6-3.2 hectares of land, and around 14% of farmers own bigger than 3.2 hectares of land. Majority of farmers grow only 1 crop and practice subsistence farming. 58% of farmers grow only one crop and 79% of farmers consume more than 50% of the production. Figure 4 shows potential production of provinces around Tonle Sap and Mekong Basin.

## 2.2 General information of Battambang province

Battambang Province, located in north-western Cambodia, 291 km from Phnom Penh, borders to the east and south to Pursat, west of Pailin, bordering Chan Borey province, Trat province, SrahKeo province of Thailand, north of Banteay Meanchey and Tonle Sap. Battambang administration consists of one (01) municipality and thirteen (13) districts, with 102 communes/sangkats, and 799 villages, and the total population is 997,169 (6.4%) which 506,745 is female and 490,424 is male. Land area 11,702 km<sup>2</sup>, population density was 85 persons per km<sup>2</sup> (GPCC 2019)



**Figure 5:** Map of Battambang Province

Approximately 76% of the total populations in Battambang province have fully relied on agricultural productions, especially the rice production. It is the first source of family income generating towards improvement of livelihoods. In addition to this, approximately 24% of populations have had own business, handicraft, and employments within/outside the province and nearby neighboring country. Battambang province has divided land areas into three main areas such: i) Upland: (Highland or Mountainous Area) is an area of fruit and vegetable plantation in the west of Battambang Province, ii) Plain land (Rice fields), which stretches along National Road 5, including MungRussei, Sangke, Battambang and ThmaKoul districts, and iii) Lowland: Tonle Sap area, located east of Battambang, consists of MungRussei, Sangkae, AekPhnum and ThmaKoul districts. In the rainy season, those land areas were flooded every year, part of this area is a flooded forest in the rainy season and the vegetable crops planted during the dry season.

Battambang has a total area of 1,162,200 hectares, of which 415,200 hectares are for agricultural land areas (35.72%) and divided into 3 parts such; i) Floating rice land areas are comprised of 32,600 hectares; ii) Rice land areas are comprised of 282,500 hectares; and iii) Crop land areas are comprised of 100,100 hectares. In addition to agricultural cultivated land areas, the 38.22% is the mountain areas, 12.54% is the flooded forests, and 3.65% is the rivers, lakes, and reservoirs.

## 2.2.1 Rice Production

### A. Description

In 2014, the rice cultivated areas had total 307,830 hectares and increased total 387,373 hectares in 2018, with an increase in a total of 80,543 hectares. Within last 5-years, average rice cultivated land areas increased by 6.17%. The yield harvested areas existed of 297,089 hectares in 2014 and increased total 345,577 hectares in 2018, with an increase in a total of 57,488 hectares. In last past 5-years, average rice yields harvested areas increased by 4.71%. Therefore, the average rice yields increased by 4.43% per year, but the total quantity of rice-yields achieved 13.13% in average.

**Table 1:** Rice production of Battambang

Description	2014	2015	2016	2017	2018	% Variance 2014-2018
Rice cultivated areas (Ha)	306,830	305,892	308,848	354,136	387,373	6.17%
Rice Harvested area (Ha)	297,089	294,959	298,118	345,162	354,577	4.71%
Rice yields (T/Ha)	2.83	2.57	2.92	3.14	3.32	4.43%
Total Production (T)	840,762	758,045	870,505	1,083,809	1,177,196	13.13%
Rice surplus (T)	260,492	310,517	350,098	465,375	519,794	19.14%
Paddy surplus (T)	407,019	485,183	547,028	727,149	812,178	19.14%

**Table 2:** Rice productions by season and water conditions

Description	Harvested areas (Ha)	Rice yield (T/Ha)	Rice Production (T)	% Of total rice production
Beginning of rainy season (without irrigation system)	270,005	2.2	515,869	57.52%
Beginning of rainy season (with irrigation system)	109,181	2.8	505,999	16%
Dry seasonal rice	23,446	3.5	84,115	3.35%

Source: Battambang Province (PASDP, 2020)

## 2.2.2 Subsidiary and industrial Crops

### A. Description

The total cultivated areas for subsidiary crops areas were assessed that in average it had increased approximately 4.51% annually, from 216,099 hectares in 2014 to 253,487 hectares in 2018. But the total subsidiary crop productions had decreased - 4.29 % in average per year, from 4,639,252 tons in 2014 to 3,669,019 tons in 2018 as shown in table 3.

**Table 3:** Subsidiary Crops (Corn, Cassava, Java, Vegetable, Beans, Peanuts, Soybeans, Sesame, Cane)

Description	2014	2015	2016	2017	2018
Harvested areas (Ha)	216,099	197,174	198,121	217,203	253,487
Yields (T/Ha)	21.46	25.71	21.03	14.76	14.47
Production (T)	4,639,252	5,069,304	4,167,240	3,207,060	3,669,019

Source: Battambang Province (PASDP, 2020)

The total cultivated areas for industrial crops were evaluated that in average it had increased approximately 22.41% annually, from 6,484 hectares in 2014 to 14,146 hectares in 2018. The total industrial crop productions also had increased 33,07% in average per year, from 80,526 tons in 2014 to 201,799 tons in 2018 as shown in table 4.

**Table 4:** Industrial Crops (Rubber, Orange, Mango, Cashews, Peper, Durain, Rambutan, Longan, Dragon fruit)

Description	2014	2015	2016	2017	2018
Harvested areas (Ha)	6,484	7,052	7,553	11,570	14,146
Yields (T/Ha)	12.42	10.64	13.27	18.14	14.26
Production (T)	80,526	75,057	100,236	209,893	201,799

Source: Battambang Province (PASDP, 2020)

### 2.2.3 Animal production and animal health

#### A. Description

In between 2014 and 2018, average cow raising had increased approximately 0.10 %, from 117,543 heads in 2014 to 184,939 heads in 2018. But average buffalos raising had gone down approximately - 7.54%, from 4,597 heads in 2014 to 3,173 heads in 2018. The buffalo production went down remarkably because farmers have abandoned ploughing by using buffalos as labour force to the uses of machinery (such tractor/walking tractor), so the farmers have faced such problems; shortage of labour forces, migration, and shortage of water sources and grass fields for buffalos raising. And for cow production, the farmers or companies have raised cows in farms for business trading within and outside the province.

In the past five years (2014-2018), the pig production varied noticeably because in average it has decreased approximately -3.09 % from 82,889 heads in 2014 to 59,786 heads in 2018. This is because some farmers postponed raising due to high production costs such as feeds, animal medicine, low price of meats what is why some farmers changed it to new occupations.

In the past five years, the poultry raising (chicken, ducks, and other birds) in farms by household farmers had increased annually 0.5 % in average, from 3,137,201 heads in 2014 to 3,145,675 heads in 2018. And chicken raising had decreased in 12,576 heads by declining from 1,066,219 heads in 2014 to 1,053,643 in 2018, and ducks raising had also decreased in 148,685 heads by declining from 462,527 heads in 2014 to 313,842 heads in 2018.

**Table 5:** Animal production and animal health

Description	2014	2015	2016	2017	2018	% Variance 2014-2018
Cows (head)	177,543	177,224	178,942	181,186	184,939	0.10%
Buffalos ( head)	4,597	4,228	3,492	3,344	3,173	-7.54%
Pigs (head)	82,889	73,899	57,721	50,164	59,786	-3.09%
Poultry ( chicken ducks-birds)	3,137,201	3,223,753	3,145,727	2,797,455	3,145,675	0.50%
Goats (head)	1,142	1,223	1,908	2,101	2,527	18.69%

Source: Battambang Province (PASDP, 2020)



# Chapter 3 Methodology

## 3.1 Observational units and target populations

Cambodia has some distinctive characteristics in the matter of agriculture as it is extremely competitive, diversified and professional, for example, Cambodia is exporter of rice and raw paddy rice, cassava, peanut soybean, and enterprises navigate domestically and internationally demand. Undoubtedly, the country has various farming systems. For this study, we've selected Battambang province as a target area to collect SDG 2.4.1 data since this province is the center of the agro-industrial industry in Cambodia and the province's fertile rice fields have led to a mostly agricultural economy. The observational unit focused on farming households and target population is household exclusively.

## 3.2 Sampling Design

Sample frame of the survey is from District Agriculture Office (DAO) listing in year 2021 under the Provincial Department of Agriculture, Forestry and Fisheries, Cambodia (PDAFF). The planned sample size is 220 samples.

For this pilot survey, the following approach was used to allocate the sample of 220 households.

- **Step 1:** Select 3 districts from 13 districts of Battambang province in term of leading agricultural area and high production priority.

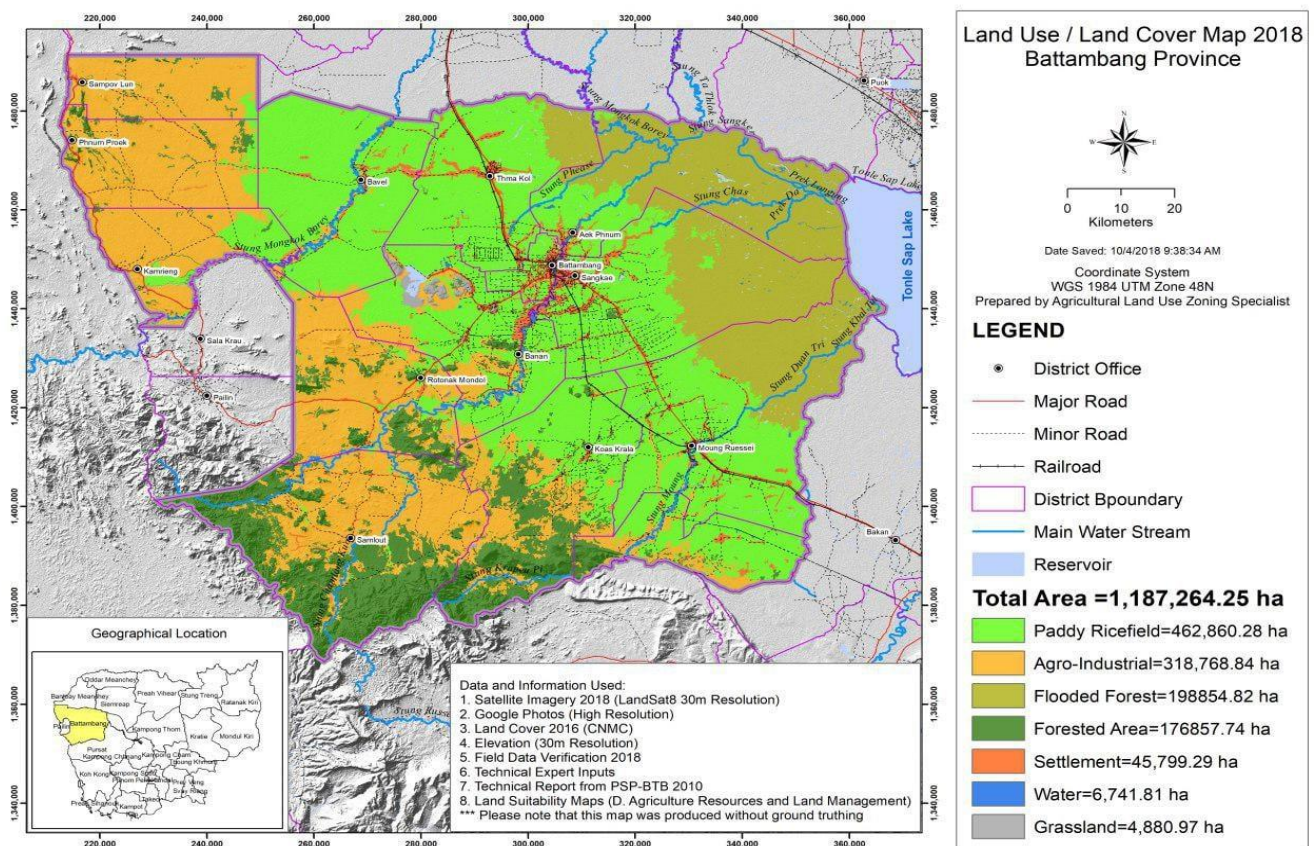


Figure 1: Land use of Battambang province

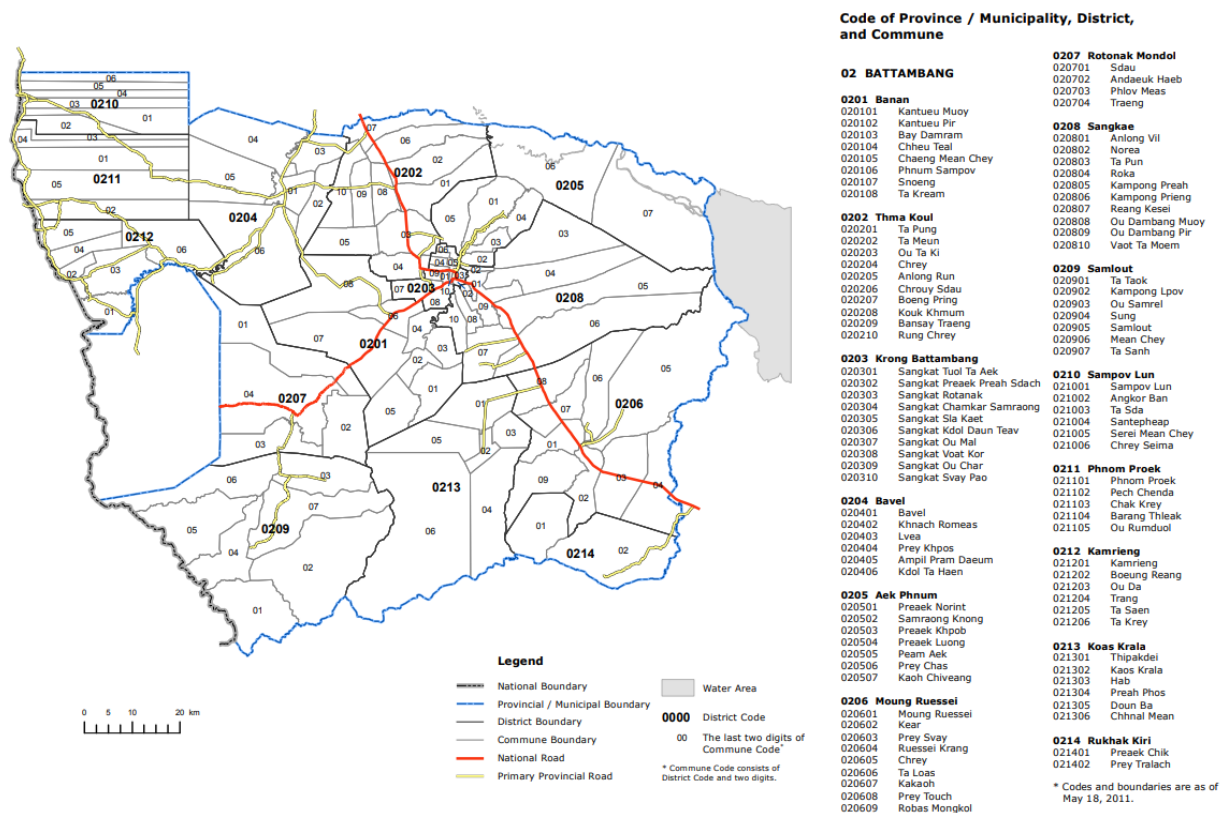


Figure 2: Administrative Areas in Battambang Province by District and Commune (Official statistic of Japan, 2011)

Table 1: Rank of potential agricultural crop production in Battambang province

Potential Agricultural Crop production	Location Where the Crops are Grown	Priority Rank 1: High, 2: Medium, 3: Low
Rice production	<b>Thma Koul</b> , <b>Bavel</b> , Aek Phnum, Moug Ruessei ,Sangkae, and <b>Banan</b> ,	1
Cassava Production	Rotonak Mondol, Kamrieng, Phnum Proek., Sampov Lun, Samlout, <b>Bavel</b> , Rukakiri, Koas Krala, Kamrieng,	2
Vegetable production (Cucumbers/cabbages, long beans, and pumpkin)	<b>Thma Koul</b> , <b>Bavel</b> , Moug Ruessei, Sangkae, <b>Banan</b> , Aek Phnum, Koas Krala, Krong Battambang	3
Fruit trees (Mango, pineapple, orange, durian, longan, and rambutan)	Rotonak Mondol, Sampov Lun, Samlout, Kamrieng, <b>Banan</b> , Phnum Proek, <b>Bavel</b> , Sangkae, Koas Krala	3
Industrial crop production (Corn, green bean, rubber, banana, and sesame)	Rotonak Mondol, Sampov Lun, Samlout, Kamrieng, <b>Banan</b> , Phnum Proek, <b>Bavel</b> , Sangkae, Koas Krala	3

Source: Agriculture Services Program for Innovation, Resilience and Extension (ASPIRE), 2020

Table 2: Rank of potential forestry production in Battambang province

Potential Forestry Production	Location Where the Forestry Products Are Located	Priority Rank (1: High, 2: Medium, 3: Low)
Sweet Bamboo shoot	Kamrieng, <b>Bavel</b> , <b>Banan</b> , Samlout, Ratanakmodol, Rukkhakiri	1
Cardamom		2
Forest bamboo		2
Plants (plantlets)	Kamrieng, <b>Bavel</b> , <b>Banan</b> , Samlout	3
Mushroom		3
Leaf blossom		3

Source: Agriculture Services Program for Innovation, Resilience and Extension (ASPIRE), 2020

Table 3: Rank of potential livestock production in Battambang province

Potential Livestock	Location Where the Livestock Are Raised	Priority Rank (1: High, 2: Medium, 3: Low)
Chicken	Moung Ruessei, Rotonak Mondol, <b>Thma Koul</b> , <b>Bavel</b> , Sangkae, <b>Banan</b>	1
Duck	<b>Thma Koul</b> , Battambang, Sangkae, <b>Bavel</b> , Moung Ruessei,	2
Cow	Moung Ruessei, <b>Bavel</b> , Sangkae, <b>Banan</b> , Rotonak, Mondol, Rukhak Kiri, Koas Krala, Aek Phnum, Phnum Proek,	3
Pig	Sangkae, <b>Thma Koul</b> , <b>Bavel</b> , Moung Ruessei, Phnum Proek,	3
Buffalo	Koas Krala, Moung Ruessei, Rotonak Mondol, Sangkae	3

Source: Agriculture Services Program for Innovation, Resilience and Extension (ASPIRE), 2020

In this stage, Banan, Thma Koul and Bavel districts were selected for a pilot survey because these 3 districts are in top rank of crop production, forestry production and livestock production in Battambang province.

- **Step 2:** Purposively select 8 communes out of 26 communes of 3 districts in term of relatively high concentrations of farm households that near to each other.

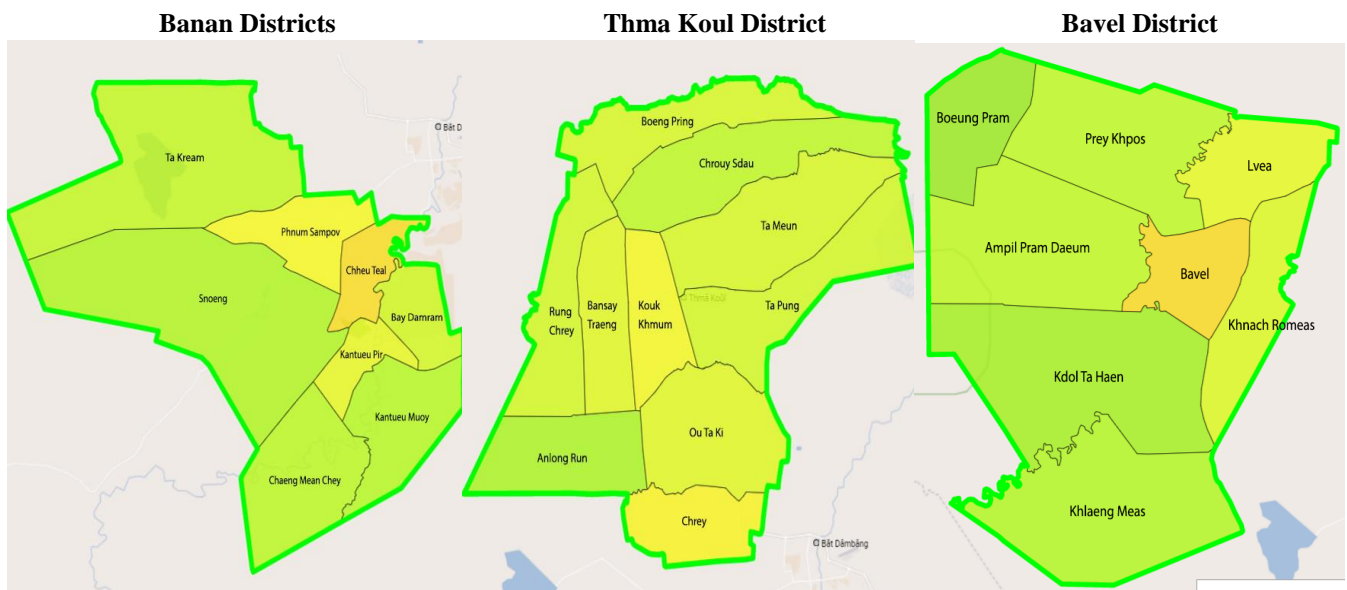


Figure 3: communes in Banan, Thma Koul and Bavel districts (citypopulation,2021)

According picture above, we've selected 3 communes from Banan district, 2 communes from Thma Koul and 3 communes from Bavel districts

- Banan = Kantueu Muoy, Kantueu Pir and Chheu Teal
- Thma Koul = Ta Meun and Ou Ta Ki
- Bavel = Bavel, Kdol Ta Haen and Khlaeng Meas

- **Step 3:** Purposively select sample villages out of 94 villages in 8 communes in term of number of active on agricultural activities.
- As a results, we've selected 9 villages from Banan district, 6 villages from Thma Koul district and 11 villages from Bavel districts (total 26 villages) because these villages has potential land and 80 % of household in villages have main agricultural activities in crops (such as rice, cassava, vegetables) and livestock or poultry raising



Banan		Thma Koul		Bavel	
Communes	Villages	Communes	Villages	Communes	Villages
Kantueu Muoy	Thmei, and Kampong Ampil	Ta Meun	Ta Sei, Samraong, and Thmei	Bavel	Svay Chrum, Doun Av, and Samraong Chey
Kantueu Pir	Post Kantueu, and Phnum Kol,	Ou Ta Ki	Ou Ta Ki, Popeal Khae and Tras	Kdol Ta Haen	Peam, Tuol Krasang, Kdol Leu and Ta Kot
Chheu Teal	Anlong Ta Mei, Khnar, Svay Prakeab, Chhak Pou and Doung			Khleang Meas	Buo Sangkreach, Khleang, Prey Thum, Chrang Bak

**Remarks:** 220 samples were purposively selected due to a limited time; a limited budget and the duration of pilot was also coincided with the spread of Covid-19. Hence, survey efficiency was considered by selecting villages that were near to each other and concentrated in the commune. This is because samples can be adjusted as it is easier to find alternative farmers if there are difficulties in reaching some area, households or individual member of some households or some household refuse to response due to Covid-19.

- **Step 4:** Randomly select sample households by proportional to amount farmers in villages using number of planned sample size (220 samples) multiplied by number of farm household in each village and divided by total number of farm households in 3 districts (3588 households)

District	Commune	Village	Total Households	No. of Sample Households
Banan	Kantueu Muoy	Thmei	128	8
		Kampong Ampil	65	4
	Kantueu Pir	Post Kantueu	27	2
		Phnum Kol	62	4
	Chheu Teal	Anlong Ta Mei	85	5
		Khnar	63	4
		Svay Prakeab	167	9
		Chhak Pou	34	3
	Doung	127	8	
<b>Subtotal</b>			<b>758</b>	<b>47</b>
Thma Koul	Ta Meun	Ta Sei	207	13
		Samraong	113	7
		Thmei	121	7
	Ou Ta Ki	Ou Ta Ki	239	15
		Popeal Khae	219	13
		Tras	244	15
<b>Subtotal</b>			<b>1143</b>	<b>70</b>
Bavel	Bavel	Svay Chrum	103	6
		Doun Av	103	6
		Samraong Chey	104	6
	Kdol Ta Haen	Peam	86	5
		Tuol Krasang	202	12
		Kdol Leu	57	3
		Ta Kot	135	8
	Khleang Meas	Buo Sangkreach	145	10
		Khleang	147	10
		Prey Thum	359	22
	Chrang Bak	246	15	
<b>Subtotal</b>			<b>1687</b>	<b>103</b>
<b>Total</b>			<b>3588</b>	<b>220</b>

As a results, the number of farm households in Banan, Thma Koul and Bavel are 47, 70 and 103 respectively.

No.	District	Sample of Commune	Sample of Village	T_HH	SHH_size
1	Banan	3	9	758	47
2	Thma Koul	2	6	1143	70
3	Bavel	3	11	1687	103
	<b>Total</b>	<b>8</b>	<b>26</b>	<b>3588</b>	<b>220</b>

### 3.3 Data Collection

The research was utilized by primary data. The data collected through well-structured questionnaire includes 5 sections and 59 main questions as follows; Section I: Introduction to the survey module and Identification of the holding and holder 10 questions, Section II: Area of the holding 4 questions, Section A: Economic Dimension 9 questions, Section B: Environmental Dimension 22 questions and Section C: Social Dimension 9 questions. (For detail attached questionnaires and Enumerator Manual in Annex1 and 2).

Survey procedure all data in the SDG Indicator 2.4.1 were collected in de facto method by a group of trained enumerators and supervisors directly interviewing eligible members of the agricultural households. For this project, DPS team has conducted face to face surveys in 3 Districts (Banan, Thma Koul and Bavel) of Battambang Province by using both Paper and Pencil Interviewing (PAPI) and KoBo Collect application for the computer-Assisted Personal Interviews (CAPI). CAPI is one kind of interviewing technique in which the interviewer or respondent uses tablets or smart phones to answer the questions. KoBo Collect is used for primary data collection. This app can enter data from interviews or other primary data both online or offline. There are no limits on the number of forms, questions, or submissions (including photos and other media) that can be saved on device. After data collection, we will transfer data from CAPI and entry survey data from paper-based questionnaire into Microsoft Excel for data cleansing.

### 3.4 Action Plan and Actual implementation

#### 3.4.1 Action Plan

The Letter of Agreement (LoA) of SAS-PSA project was signed between AFSIS Secretariat and the Department of Planning and Statistics of Ministry of Agriculture Forestry and Fisheries, Cambodia with the implementation period starting from 1<sup>st</sup> September 2021 – 8<sup>th</sup> July 2022.

**Table 1: Action plan**

No	Items	Date
1	Select a target province and sampling design	September 2021
2	Prepare the meeting for relevant stakeholders	October 2021
3	Prepare training workshop to DPS officials and relevant organizations including enumerators	November 2021
4	Participate in training workshop	December 2021
5	Conduct the pilot survey and examine the issues for improvement	January 2022
6	Tabulate and analyse results of the survey	February 2022
7	Write the summary report on results of survey	March 2022
8	Prepare the In-country wrap up meeting with DPS	April 2022
9	Participate in the In-country wrap up meeting	June 2022
10	Write the final report of the activities in Cambodia	July 2022

### 3.4.2 Actual implementation

**Table 2: Actual Activities**

No	Activities	Date	Remarks
1	Meeting on target province selection and sampling design	14 September 2021	Done
2	Meeting for relevant stakeholders	27 October 2021	Done
3	Training workshop for DPS officials and enumerators on data collection	24-25 December 2021	Done
4	Review and discussion Meeting with enumerators	23 January 2022	Done
5	Conduct the pilot survey	24-30 January 2022	Done
6	6.1 Data entry and data cleansing	10-15 February 2022	Done
	6.2 Data analysis training for National Consultant	7-8 April 2022	Done
	6.3 Data analysis training for DPS Team	29-30 June 2022	Done
7	Write the summary report	30 June 2022	Done
8	Prepare the In-country wrap up meeting with DPS	16 June 2022	Done
9	Participate in the In-country wrap up meeting	1 July 2022	Done
10	Write the final report of the activities in Cambodia	31 July 2022	Done

Table 2 above shows the actual implementation of SAS-PSA project done by the DPS. The target province and sampling design has been assigned on 14 September 2021 at the consultative meeting. The meeting for relevant stakeholders, the training workshop to enumerators, review and discussion meeting with enumerators, the pilot survey, creation of calculation platform and training workshop on tabulate and analyse results of the survey to DPS team have done accordingly in 11 months' time (September 2021 – July 2022). The wrap-up meeting was held on 1<sup>st</sup> July 2022.

However, the implementation of the project has been delayed due to the COVID-19 pandemic. After the consultation with the AFSIS Secretariat, the final report submission was postponed from the original plan (by 8<sup>th</sup> July 2022) to the end of July (31<sup>st</sup> July 2022).

**3.4.3 Project Activities**

**1. Meeting on target province selection and sampling design**

The Meeting between the DPS team was conducted on 14 September 2022 to seek for a mutual understanding on the implementation plan of the project, select a target province and sampling design. The meeting had 2 sessions. The morning session was held at Bavel Agricultural Office with 8 participants, and the afternoon session was held at Thma Koul agricultural office with 8 participants (total 16 participants).

The meeting mainly discussed: 1) target province of the pilot survey, 2) populations and observation, 3) questionnaire and type of questionnaire, 4) enumerator training and data analysis training, 5) field survey, and 6) program to tabulate and analyze the results of the survey. The comments and suggestions gathered from the meeting were taken into account for planning a pilot survey and future plans of the SAS-PSA project in Cambodia.



**2. Meeting for relevant stakeholders**

On 27 October 2021, the Stakeholders Meeting was conducted out of the collaboration between AFSIS Secretariat and Department of Planning and Statistics (DPS), Ministry of Agriculture Forestry and Fisheries (MAFF), the Kingdom of Cambodia as a Video Conference.

Main objectives of the Stakeholders Meeting are to inform all the stakeholders in the MAFF of Cambodia regarding the core objectives, activities details, and the future work plan of the SAS-PSA project. This also includes discussing the on-going implementations of the SAS-PSA project in Cambodia and receiving any comments or suggestions from the stakeholders.

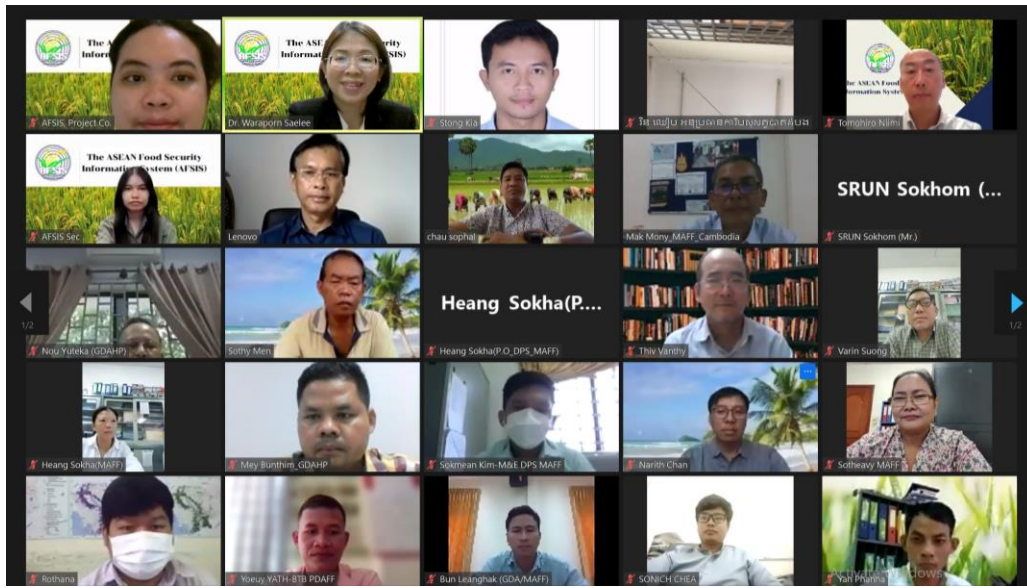
The meeting included 24 delegates from DPS, General Director of Agriculture (GDA) DALM, Crop department, Department of Industry Agriculture (DIA), Provincial Department Agriculture, Forestry and Fisheries (PDAFF), General Director of Animal Health Production (GDAHP), and 4 persons from AFSIS Secretariat. Total 28 persons.

In the meeting, the delegates were presented with the information on Agricultural Policy in Cambodia by Mr. Mak Mony, the Director of DPS, MAFF of Cambodia. Then, it followed by the



background of the SAS-PSA Project, along with the brief methodology of SDG indicator 2.4.1 by Mr. NIIMI Tomohiro, the Japanese Expert.

**Picture activities of the Stakeholders Meeting in Cambodia (27 October 2021)**



**3. Training Workshop for DPS officials and enumerators on data collection**

The training workshop for DPS officers and enumerators was held on 24-25 December-2021 at Siemreap Province, Cambodia as a physical workshop. The training was jointly organized by Agricultural Statistics office, Department of Planning and Statistics, Ministry of Agriculture, Forestry and Fisheries, Cambodia, under the chairmanship of Mr. Mak Mony, Director of Department of Planning and Statistics, Ministry of Agriculture, Forestry and Fisheries. This training was attended by the enumerators and supervisors from Battambang Provincial Department of Agriculture, Forestry and Fisheries (PDAAF) and DPS team, total 14 persons.

Two days of training included structure of questionnaire, the theory of list of themes and sub-indicators of SDG 2.4.1, definitions, how to interview following the FAO questionnaire and get answers from respondents based on the Enumerator Manual to ensure that everyone has a clear understanding of survey protocols.

**Picture** activities of training workshop for DPS officials and enumerators on data collection (24-25 December-2021)



**4. Review and Discussion Meeting with enumerators**

The meeting was conducted on 23 January 2022 with 11 participants to reviewed and refreshed for better understanding of enumerators on theory of list of themes and sub-indicators of SDG indicator 2.4.1 proportion of agricultural area under productive and sustainable agriculture as well as explanation of definitions and how to ask all questions as a preparation before conducting a pilot survey on 24 January 2022.

**Picture** activities of review discussion meeting with enumerator (23 January 2022)



**5. SDG 2.4.1 Field Survey in Battambang Province, Cambodia**

This activity aims for enhancing the building capacities, knowledge, as well as experiences of the DPS officials and enumerators on SDG 2.4.1 data collection process according to FAO protocols in order to adapt and improve the SDG 2.4.1 survey of Cambodia in the national level. The pilot survey in Cambodia was conducted for 7 days started from 24th – 30<sup>th</sup> January 2022. In this survey, 3 supervisors and 7 enumerators were divided into 3 team (1<sup>st</sup> team 3 persons, 2<sup>nd</sup> team 4 persons and 3<sup>rd</sup> team 4 persons) and paper-based questionnaire and CAPI are used for data collection.



**Table 8:** Number of households in target area by team

No.	District	No. of Commune	No. of Village	No. of Sample	Enumerator Team
1	Banan	3	9	47	1 <sup>st</sup> team (3 person)
2	Thma Koul	2	6	70	2 <sup>nd</sup> team (4 person)
3	Bavel	3	11	103	3 <sup>rd</sup> (4 persons) and 1 <sup>st</sup> team (3 person)
	<b>Total</b>	<b>8</b>	<b>26</b>	<b>220</b>	<b>3 team</b>

Before conducting the field survey, we had to prepare all materials such as installing the Kobo Collect application to smart phones or tablets, tablet cases to protect tablets from water damage, chargers, power banks, extra-tablets, SIM-cards, internet packages, masks, hand sanitizer, bags and Paper based questionnaires for 7 enumerators and 3 supervisors including contingency budgets for renting motorbikes, car and etc.

The enumerators worked very hard for the field survey in Battambang Province in the dry season. It took around 2 hours for some enumerators to go to the field by motorcycle, walk, and travel by car to villages and sample households. The interview time was around 30-50 minutes per questionnaire. The field survey was completed successfully with great cooperation of farmers, and enumerators were able to collect 220 sample households as planned.

**Picture** activities of field survey in Banan District (25 January 2022)





**Picture** activities of enumerator field survey in Thma koul district (26 January 2022)

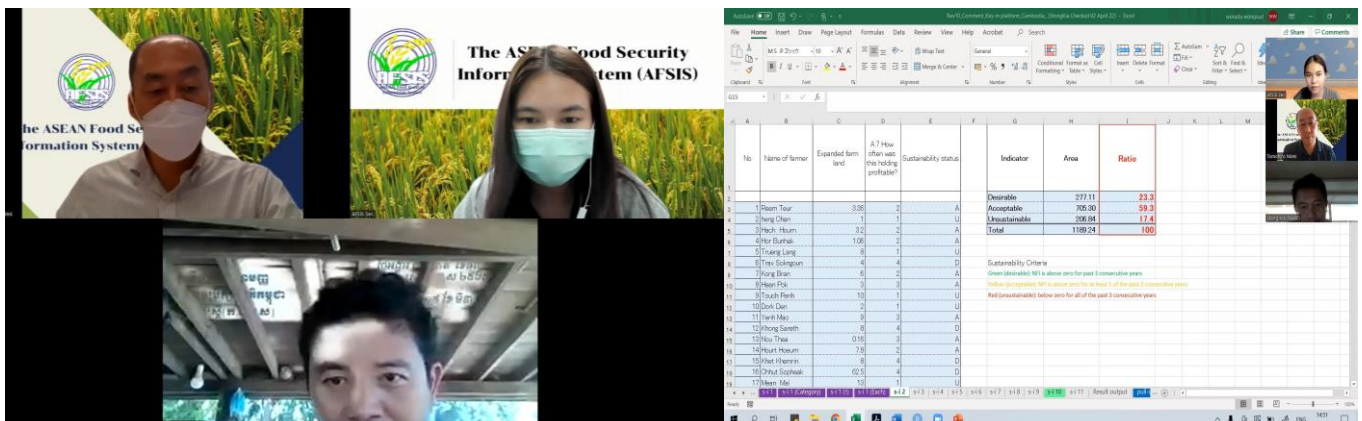


## 6. Data Analysis Training of SAS-PSA Project in Cambodia

Two training workshops were organized for the National Consultant and DPS officer to enhance their ability to evaluate data and gain a better grasp of the formula, themes, and sub-indicators of SDG indicator 2.4.1 by using Microsoft Excel on Sub-indicator 1-9 and 11, as well as using “R” program for Sub-indicator 10 for computing the sustainability status of 220 samples in Battambang Province.

- 1<sup>st</sup> training workshop was conducted 7-8 April 2022 as an online workshop. In this training, Mr. NIIMI Tomohiro, the Japanese expert, has trained Mr. Stong Kia, the National Consultant of the SAS-PSA project in Cambodia for a clear understand on each sub-indicator so he could pass on his knowledge to DPS staff in the 2<sup>nd</sup> session of the training.

**Picture** activities of Data Analysis Training in Cambodia of SAS-PSA Project (7-8 April 2022)





- 2<sup>nd</sup> training workshop was conduct on 29-30 June 2022 in Siem Reap, Cambodia with 16 DPS officials and 6 persons from AFSIS Secretariat. During the training, Mr. NIIMI Tomohiro, the Japanese Expert, and Mr. Stong Kia, the National Consultant of Cambodia were the lead lecturers. In each session, the method of calculation of each sub-indicator was discussed among the participants for their better understanding so they can practice and apply the knowledge to further implementation of SDG indicator 2.4.1 effectively.

**Picture** activities of Data Analysis Training in Siem Reap, Cambodia (29-30 June 2022)



## 7. Wrap-up meeting of the SAS-PSA project in Cambodia

The Department of Planning and Statistics (DPS), Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia, together with AFSIS Secretariat, had conducted the Wrap-up meeting on 1 July 2022. There are 7 participants from DPS had attended the Wrap-up meeting.

The main purpose of the Wrap-up meeting was for DPS officials to report to the Meeting regarding the detail and summary of the SAS-PSA project in Cambodia, including the action plan, the sampling design, the result from the pilot survey, and the analysis outcomes of SDG indicator 2.4.1 in Battambang province. Moreover, the challenges and suggestions for the SAS-PAS project were discussed.

Lastly, Mr. Mak Mony was honored to give some comments on the improvement of the project which will be essential information for the implementation of the national survey of SDG indicator 2.4.1 in Cambodia in the future. The meeting went successfully with great cooperation from both DPS officials and AFSIS Secretariat.

**Picture** activities of the Wrap-up Meeting (1 July 2022)



### 3.5 Data Analysis (SDG 2.4.1 Methodological note)

This study was used SDG 2.4.1 Methodological note of FAO (for detail attached in Annex 3) with both descriptive methods for data analysis of Supporting Agricultural Survey on Promoting Sustainable Agriculture in Battambang Province. Data were analyzed by using Microsoft Excel Platform, R and RStudio software for the detail as below:

1) Descriptive Analysis, the basic features of the data are described by descriptive statistics, together with simple graphics and table analysis. Descriptive statistics were used to analyze the Characterization of Farm households. It was taken through quantitative and qualitative variables that were significant in understanding farm households' socio-economic environmental characteristics, types of farming systems, and so on by frequencies, mean, standard deviations, and percentages of these variables were obtained

2) Model Analysis, this study used Microsoft Excel Platform to analyze sub-indicator 1-9 and 11 of SDG 2.4.1 of farm households in Battambang Province and analyzed data for sub-indicators 10 Food Insecurity Experience Scale (FIES) by R and RStudio program and preparing the data for analysis in excel platform, Parameter estimation, to find the probability value then Calculation of the sustainability status of the agricultural holding.

3) List of sub-indicators, the proposed list of themes and sub-indicators was obtained through consultations. The list of selected themes and sub-indicators is provided in Figure 3.1. In total 11 themes are included.

Figure 3. 1 the list of themes and sub- indicators of sustainable production: Economic, Environmental, and Social

Dimensions	No	Theme	Sub-Indicator
<b>Economic</b>	1	Land productivity	Farm output value per hectare
	2	Profitability	Net farm income
	3	Resilience	Risk mitigation mechanisms
<b>Environmental</b>	4	Soil health	Prevalence of soil degradation
	5	Water use	Variation in water availability
	6	Fertilizer pollution risk	Management of fertilizers
	7	Pesticide risk	Management of pesticides
	8	Biodiversity	Use of agro-biodiversity-supportive practices
<b>Social</b>	9	Decent employment	Wage rate in agriculture
	10	Food security	Food insecurity experience scale (FIES)
	11	Land tenure	Secure tenure rights to land

Note: The table was reprinted from SDG Indicator 2.4.1 – Proportion of agricultural area under productive and sustainable agriculture, by FAO, 2020 for detail attached in Annex 3

### 3.6 Assessing sustainability performance for each sub-indicator

For each sub- indicator, criteria to assess sustainability levels are developed. The concept of sustainability implies an idea of continuous progress and improvement towards better performances across all themes and such performances can therefore be more or less sustainable. In order to capture the concept of continuous progress towards sustainability, a “traffic light” approach is proposed, in which three sustainability levels are considered for each sub-indicator.

- **Green:** desirable
- **Yellow:** acceptable
- **Red:** unsustainable

While a certain level of subjectivity is unavoidable, this approach allows identification, for each theme, of conditions of critical unsustainability (red), conditions that can be considered desirable (green) and, in between, intermediate conditions that are considered acceptable but would need to be scrutinized in terms of possible improvements (yellow). This approach also acknowledges the trade-offs existing between sustainability dimensions and themes, and the need to find an acceptable balance between them.

Each sub-indicator is assessed at the level of the agricultural households. The sustainability level is then associated with the agricultural land area of the agricultural households. All sub-indicators for a given farming household therefore refer to the same agricultural land area.

#### **Sub-indicator 1: Farm output value per hectare**

**Dimension:** economic theme land productivity coverage all farm types

**Description:**

- Farm output value: The volume of agricultural output at the farm level generally takes into account the production of multiple outputs, e.g., crop types and crop and livestock combinations, etc. Since not all outputs are measured in the same unit, and different outputs represent different products. It is necessary to establish an appropriate means of aggregation, in this case using a monetary unit (i.e., quantity multiplied by prices).

- Farm agricultural land area: defined as the area of land used for agriculture within the farm

**Calculation steps:**

**Step 1:** Categorize farms by type of holding

- 1) Household and non-household sectors,
- 2) Main type of production and
- 3) Whether or not they irrigate the agricultural are

**Step 2:** calculate the farm output value per hectare

$$\text{Farm output value per hectare}(i, f) = \frac{\text{Farm output value (LCU)}_{i,f}}{\text{Agricultural land area (in hectares)}_{i,f}}$$

Where; *Farm output value per hectare*  $i, f$  is the total value of production of the  $i$ -th agricultural holding (with  $f$  going from 1 to 12); *Agricultural land area (in hectares)*  $i, f$  is the agricultural land area, as expressed in a hectare of the  $i$ -th agricultural holding (with  $f$  going from 1 to 12)

**Step 3:** After calculating the farm output value per hectare, the values are sorted from the lowest value to the highest productivity by categories of farms. The value of farm output value per hectare related to the 90th percentile is derived accordingly for each category, using the following formula: **90th=0.9 x total number of observations**

**Step 4:** classify the agricultural area of the farm according to the following sustainability In general, the sustainability status of agricultural holdings is determined depending on whether (or not) the farm output value per hectare is above, below, or in between the thresholds set it belongs to. For the computed farm output value per hectare must be benchmarked against the following thresholds for sustainability by category:

- **Green (desirable):** if the farm FOVH is equal to or greater than the value corresponding to 2/3 of the 90th percentile
- **Yellow (acceptable):** if the farm FOVH is equal to or greater than the value corresponding to 1/3 but less than 2/3 of the 90th percentile
- **Red (unsustainable):** if the farm FOVH is less than the value corresponding to 1/3 of the 90th percentile

### **Sub-indicator 2: Net farm income**

**Description:** The sub-indicator captures whether a farm is profitable over a 3-year period. The focus of this sub-indicator is on income from farming operations as distinct from the total income of the farming household, which may include other sources of income. Sustainability criteria: The following sustainability criteria have been defined to classify the agricultural area of the farm by sustainability status:

- **Green (desirable):** above zero for past 3 consecutive years
- **Yellow (acceptable):** above zero for at least 1 of the past 3 consecutive years
- **Red (unsustainable):** below zero for all of the past 3 consecutive years

### **Sub-indicator 3: Risk mitigation mechanisms**

**Description:** This sub-indicator measures the incidence of the following mitigation mechanisms:

- Access to or availed credit.
- Access to or availed insurance.
- On-farm diversification (share of a single agricultural commodity not greater than 66% in the total value of production of the holding).

- Access to credit and/ or insurance is defined here as when a given service is available and the holder has enough means to obtain the service (required documents, collateral, positive credit history, etc.). Broadly, access to one or more the above 3 factors will allow the farm to prevent, resist, adapt and recover from external shocks such as, floods, droughts, market failure (e.g. price shock), climate shock and pest/animal diseases.

**Sustainability criteria:** The following sustainability criteria are defined to classify the agricultural area of the farm by sustainability status:

- **Green (desirable):** Access to or availed at least two of the above-listed mitigation mechanisms.
- **Yellow (acceptable):** Access to or availed at least one of the above-listed mitigation mechanisms.
- **Red (unsustainable):** No access to the listed mitigation mechanisms.

**Calculation steps:** the calculation procedure for this indicator is two-step: Classify farms according to the sustainability criteria mentioned earlier.

The following data items are used to identify farms that meet at least one of the following mitigation mechanisms:

1. Agricultural holding access to credit, insurance or other financial instruments:
  - Credit (formal, informal)
  - Insurance
2. List of other on-farm activities apart from crops and livestock
3. Value of production for the listed on-farm commodities
4. Agricultural land area of the farm holding

Once the farms have been classified according to their sustainability status, the second and final step is to calculate the proportion of sustainable agricultural area. This is done by adding up the total agricultural area associated with farms classified as green, yellow or red in total agricultural area.

On-farm diversification. It captures the share of the value of production of one single agricultural commodity over total value of production of the agricultural holding. This variable is calculated according to the below formula:

$$\textit{On – farm diversification} = \frac{\textit{Value of production}_{i,c}}{\textit{Total value of production of the holding}_i} \quad [3]$$

Where the value of production of the c-th agricultural commodity is related to the i-th agricultural holding and is the total value of production of the i-th agricultural holding.

## **B. Environmental dimension**

### **Sub-indicator 4: Prevalence of soil degradation (PSD)**

**Description:** The sub-indicator measures the extent to which agriculture activities affects soil health and, therefore, represents a sustainability aspect. A review of the 10 threats to soil shows that all except one (soil sealing, which is the loss of natural soil to construction/urbanization) are potentially and



primarily affected by inappropriate agricultural practices. Ideally, therefore, all soils under agricultural land area in a country should be the subject of periodic monitoring in order to assess the impact of agriculture on soils. This requires detailed surveys and sampling campaigns, associated with laboratory testing. In order to propose a manageable solution while capturing the main trends in the country in terms of soil health, the farm survey focuses on the four threats that combine the characteristics more widespread (for national monitoring, countries may choose to add any of the other areas indicated above, depending on relevance), and easier to assess through farm surveys:

1. Soil erosion
2. Reduction in soil fertility
3. Salinization of irrigated land
4. Waterlogging
5. Other -specify
6. None of the above

The farm survey captures farmer's knowledge about the situation of the agricultural holding in terms of soil degradation. Experience has shown that farmers are very much aware of the state of their soils, health and degradation level. Farmers may also be offered the opportunity to mention other threats than the above four.

Other data sources on soil health may either complement the information collected through the farm survey and offer opportunities for cross-checking farmers' responses; or be used as alternative sources of data. Prior to the farm survey, a desk study could collect all available information on soil health, including using national official statistics or statistics available from international agencies such as FAO. This typically includes maps, models, results from soil sampling, laboratory analysis and field surveys, and all existing report on soil and land degradation at national level. On the basis of this information, maps or tables (by administrative boundaries or other divisions of the country) can be established, showing the threats to soils according to the above 4 categories of threats.

**Sustainability criteria:** The following sustainability criteria have been defined to classify the agricultural area of the farm by sustainability status:

- **Green (desirable):** The combined area affected by any of the four selected threats to soil health is negligible (less than 10% of the total agriculture area of the farm).
- **Yellow (acceptable):** The combined area affected by any of the four selected threats to soil health is between 10% and 50% of the total agriculture area of the farm.
- **Red (unsustainable):** The combined area affected by any of the four selected threats to soil health is above 50% of the total agriculture area of the farm.

**Calculation steps:** the calculation procedure consists of two steps:

**Step 1:** Information on the prevalence of soil degradation requires the computation of a number of primary variables that can be derived by inferring information from a survey related to: 1) whether or not the agricultural holding was affected by any of the above listed soil degradation threats; 2) the total



agricultural area of the holding, as well as the agricultural area of the holding that was affected by these threats; and finally 3) the share of the combined area affected by any of the four selected threats.

Agricultural area affected. This variable measures the agricultural land areas of the farm which was affected by any of the above-listed soil degradation threats, in hectares of land.

$$\text{Share of agricultural area affected by any threat} = \frac{\text{Agricultural area affected}_i}{\text{Agricultural area of the holding}_i}$$

This variable measures the proportion of the total agricultural area of the holding that was affected by soil degradation threats.

**Step 2:** this step involves calculation of the agricultural area by sustainability status.

### **Sub-Indicator 5: Variation in water availability**

**Description:** The sub- indicator captures the extent to which agriculture contributes to unsustainable patterns of water use. Ideally, the level of sustainability in water use is measured at the scale of the river basin or groundwater aquifer, as it is the combined effect of all users sharing the same resource that impact water sustainability. The farm survey captures farmer's awareness and behavior in relation with water scarcity, and associates them with three levels of sustainability. This awareness and behavior are expressed in terms of:

1. whether the farmer uses water to irrigate crops on at least 10% of the agriculture area of the farm and why, if the answer is negative (does not need, cannot afford);
2. whether the farmer is aware about issues of water availability in the area of the farm and notices a reduction in water availability over time;
3. whether there are organizations (water users organizations, others) in charge of allocating water among users and the extent to which these organizations are working effectively.

Other data sources may either complement the farm survey on water use and offer opportunities for cross- checking farmers' responses; or be used as alternative sources of data. Prior to the farm survey, a desk study should collect all available information on water balance, including national official statistics or statistics available from international agencies such as FAO. Information on water resources and use is usually collected by the entities in charge of water management or monitoring and are organized by hydrological entity (river basin or groundwater aquifer). They typically include hydrological records (river flow, groundwater levels), models and maps showing the extent of water use by hydrological entity.

**Sustainability criteria:** The following sustainability criteria have been defined to classify the agricultural area of the farm by sustainability status:

- **Green (desirable):** Water availability remains stable over the years, for farms irrigating crops on more than 10% of the agriculture area of the farm. Default result for farms irrigating less than 10% of their agricultural area.

- **Yellow (acceptable):** uses water to irrigate crops on at least 10% of the agriculture area of the farm, does not know whether water availability remains stable over the years, or experiences reduction on water availability over the years, but there is an organization that effectively allocates water among users.
- **Red (unsustainable):** in all other cases.

**Calculation steps:** the calculation procedure for this indicator envisages two steps:

**Step 1:** Information on variation of water availability requires the computation of four main primary variables that can be derived by inferring information from a survey related to:

- 1) whether or not the agricultural holding irrigated its land;
- 2) the percentage of the area of the holding where water was used for irrigating crops;

$$\text{Percentage of total area irrigated} = \frac{\text{Total area irrigated}_i}{\text{Agricultural area of the holding}_i}$$

This variable measures the proportion of the total agricultural area of the holding where water was used for irrigating crops.

- 3) whether (or not) water remains stable over years; and, finally
- 4) if there are organizations that effectively allocate water among users.

**Step 2:** The proportion of agricultural area by sustainability status is calculated by deriving the agricultural areas associated with farms under a given sustainability status.

### **Sub-indicator 6: Management of fertilizers**

**Description:** The proposed approach is based on questions to farmers about their use of fertilizer, in particular mineral or synthetic fertilizers, their awareness about the environmental risks associated with fertilizers (including manure), and their behavior in terms of fertilizer and manure management. List of management measures that help reducing risk is as follows:

- 1) Follow protocols as per extension service or retail outlet recommendations or local regulations, not exceeding recommended doses
- 2) Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers
- 3) Use legumes as a cover crop, or component of a multi/crop system to reduce fertilizer inputs
- 4) Distribute synthetic or mineral fertilizer application over the growing period
- 5) Consider soil type and climate in deciding fertilizer application doses and frequencies
- 6) Use soil sampling at least every 5 years to perform nutrient budget calculations
- 7) Perform site-specific nutrient management or precision farming
- 8) Use buffer strips along water courses.

**Sustainability criteria:** The following sustainability criteria have been adopted to classify the agricultural area of the farm by sustainability status:

- **Green (desirable):** The farm takes specific measures to mitigate environmental risks (at least four from the list above). Default result for farms not using fertilizers<sup>12</sup>

- **Yellow (acceptable):** the farm uses fertilizers and takes at least two measures from the above list to mitigate environmental risks
- **Red (unsustainable):** farmer uses fertilizer and does not take any of the above specific measures to mitigate environmental risks associated with their use.

**Calculation steps:** the calculation procedure envisages two steps:

**Step 1:** Farms are classified by sustainability status as per above-identified criteria. Information on variation on management of fertilizers requires exploring whether the agricultural holding

1) Uses (or do not use) fertilizers and 2) in case of affirmative responses the number of specific measures adopted, if any, in order to mitigate environmental risks. The sustainability status of agricultural holdings is determined depending on whether the agricultural holding uses fertilizers and on the total number of measures adopted by the holding to mitigate environmental-related risks.

**Step 2:** Calculate the proportion of agricultural areas associated with farms classified green, yellow and red.

### **Sub-indicator 7: Management of pesticides**

**Description:** The proposed sub-indicator is based on information on the use of pesticides on the farms, the type of pesticide used and the type of measure(s) taken to mitigate the associated risks. List of possible measures:

#### Health

1. Adherence to label recommendations for pesticide use
2. Use of personal protection equipment
3. Safe disposal of waste (cartons, bottles and bags)

#### Environment

4. Adherence to label directions for pesticide application
5. Adopt any of the above good agricultural practices (GAPs): adjust planting time, apply crop spacing, crop rotation, mixed cropping or inter-cropping
6. Perform biological pest control or use biopesticides
7. Adopt pasture rotation to suppress livestock pest population
8. Systematic removal of plant parts attacked by pests
9. Maintenance and cleansing of spray equipment after use
10. Use one pesticide no more than two times or in mixture in a season to avoid pesticide resistance.

**Sustainability criteria:** The following sustainability criteria have been developed to classify the agricultural area of the farm by sustainability status:

- **Green (desirable):** The farm uses only moderately or slightly hazardous<sup>15</sup> pesticides (WHO Class II or III). In this case, it adheres to all three health-related measures and at least four of the environment-related measures. Default result for farms not using pesticides.

- **Yellow (acceptable):** The farm uses only moderately or slightly hazardous pesticides (WHO Class II or III) and takes some measures to mitigate environmental and health risks (at least two from each of the lists above)
- **Red (unsustainable):** The farm uses highly or extremely hazardous pesticides (WHO Class Ia or Ib), illegal pesticides<sup>16</sup>, or uses moderately or slightly hazardous pesticides without taking specific measures to mitigate environmental or health risks associated with their use (fewer than two from any of the two lists above)

**Calculation steps:** the calculation procedure for this indicator is two steps:

**Step 1:** The sustainability status of agricultural holdings is determined depending on whether the agricultural holding uses pesticides, the type of pesticides used and on the total number of measures adopted by the holding to mitigate environmental and health related risks.

**Step 2:** Calculate the proportion of agricultural areas associated with farms classified green, yellow and red.

### **Sub-indicator 8: Use of biodiversity-supportive practices**

**Description:** this sub-indicator measures the level of adoption of biodiversity-supportive practices by the farm at ecosystem, species and genetic levels. This indicator addresses both crops and livestock. The 6 criteria are broken down as follows:

1. Leaves at least 10% of the holding area for natural or diverse vegetation. This can include natural pasture/grassland, maintaining wildflower strips, stone and wood heaps, trees or hedgerows, natural ponds or wetlands.
2. Farm produces agricultural products that are organically certified, or its products are undergoing the certification process.
3. Does not use synthetic pesticides, does not purchase more than 50% of the feed for livestock and does not use antimicrobials as growth promoters.
4. At least two of the following contribute to the farm production: 1) temporary crops, 2) pasture, 3) permanent crops, 4) trees on farm, 5) livestock or animal products, and 6) aquaculture.
5. Practices crop or crop/pasture rotation involving at least 3 crops on at least 80% of the farm area.
6. Livestock includes locally adapted breeds.

**Sustainability criteria:** The following sustainability criteria have been defined to classify the agricultural area of the farm by sustainability status:

- **Green (desirable):** The agricultural holding meets at least three of the above criteria
- **Yellow (acceptable):** The agricultural holding meets between two and four of the above
- **Red (unsustainable):** The agricultural holding meets none of above criteria

**Calculation steps:** the calculation procedure for this indicator are:

Farms are classified by sustainability status as per above-identified criteria. This sub-indicator relies on the calculation of six main criteria, four of which must be met in order for the area of the agricultural holding to be sustainable in terms of bio-diversity.

- **1st criterion:** calculates the share of the total agricultural area of the holding which is under natural or diverse vegetation and check whether the computed share is greater or lower than the 10 % of the total agricultural area of the holding as per formula below.
- **2nd Criterion:** check whether the agricultural holding that producing crops or livestock are organically certified or undergoing organic certification.
- **3rd Criterion:** check whether the agricultural holding uses medically important antimicrobials as growth promoters.
- **4th Criterion:** first, calculate if the following contribute to farm production 1) temporary crops, 2) pasture, 3) permanent crops, 4) trees on farm, 5) livestock or animal products, and 6) aquaculture, over total value of farm production. Then check if each of them represents at least 10% of the value of the holding's production.

**Step 1.** Calculate the total farm value of production.

The farm output value is calculated as the summation of the quantities () of each: crop, by-product crop, livestock, by-product livestock and on-farm commodities of the i-th agricultural holding multiplied by the corresponding farm gate prices. The measure is expressed in local currency unit (LCU).

**Step 2.** Calculate the total farm value of production from:

- 1) Value of output of crops and its by-products;
- 2) Value of output of tree products;
- 3) Value of output of livestock and animal products;
- 4) Value of output of aquaculture.

The calculation procedure is aligned with the total farm production calculated for sub-indicator 1 but it does not account for all of the commodities that are not listed among the four above-mentioned (i.e. 1) crop/pasture, 2) trees or tree products (including permanent crops like orchards or vineyards), 3) livestock or animal products and 4) fish.

**Step 3.** Once both the total farm output value and the output value from

- 1) crop/pasture,
  - 2) trees or tree products,
  - 3) livestock or animal products and
  - 4) fish/aquaculture has been calculated; the corresponding contribution is calculated as follows
- **5th Criterion:** calculate the percentage of the agricultural area on which crop rotation or crop/pasture rotation involving at least two different crops is practiced.

- **6th Criterion:** In order to ascertain whether (or not) the agricultural holding meets the sixth bio-diversity criterion, the first step consists in identifying locally adapted breeds. The next step is to check if the number of livestock locally adopted breeds out of the total breeds (both local and foreign) is greater than 1). The sustainability status of agricultural holdings is determined depending on how many of the six bio-diversity criteria are met by the agricultural holding. 2). The proportion of agricultural area by sustainability status is calculated by adding up total agricultural areas under a given sustainability status.

## C. Social dimension

### Sub-indicator 9: Wage rate in agriculture

**Description:** This sub-indicator measures the farm unskilled labour daily wage rate in the International Standard Classification of Occupation (ISCO-08 - code 92).

**Sustainability criteria:** The following sustainability criteria have been developed classify the agricultural area of the farm by sustainability status:

- **Green (desirable):** If the wage rate paid to unskilled labour is above the minimum national wage rate or minimum agricultural sector wage rate (if available). Default result for farms not hiring labour.
- **Yellow (acceptable):** if the wage rate paid to unskilled labour is equals to the minimum national wage rate or minimum agricultural sector wage rate (if available).
- **Red (unsustainable):** if the wage rate paid to unskilled labour is below the minimum national wage rate or minimum agricultural sector wage rate (if available).

**Calculation Steps:** The calculation procedure for this indicator is three steps:

**Step1:** for each farm, calculate the farm output value per hectare:

$$\text{Daily wage rate of unskilled hired labor} = \frac{\text{Total annual compensation}}{\text{Total annual hours worked}} * 8$$

To calculate the daily wage rate in agriculture, the following data items are required:

- **Unskilled workers hired on the agricultural holding (Yes/No):** unskilled workers as defined according to the International Standard Classification of occupation unskilled workers are workers performing basic and routine tasks in the agricultural sector.
- **Average pay in-cash and/or in-kind for a hired unskilled worker per day (of 8 hours)**
- **Minimum agricultural sector wage rate (if available) or minimum national wage rate**

**Step 2:** once the daily wage is calculated, farms are classified by sustainability status by benchmarking the daily wage rate against the national or agricultural sector minimum wage.

Farms are classified as green (desirable) if their daily wage rate paid to unskilled workers is greater than minimum national wage rate or minimum agricultural sector wage rate (if available).

- Farm are classified as yellow (acceptable) if their daily wage rate paid to unskilled workers is equal to the minimum national wage rate or minimum agricultural sector wage rate (if available).

- Farm are classified as yellow red (unsustainable) if their daily wage rate paid to unskilled workers is equal to the minimum national wage rate or minimum agricultural sector wage rate (if available).

**Step 3:** calculate the proportion of sustainable agricultural area by sustainability status. This is done by adding up the total agricultural area associated with farms classified as having a given sustainability status (green, yellow or red) in total agricultural area. It is important to notice that the final sub-indicator only accounts for total agricultural area associated with farms employing paid labor.

### Sub-indicator 10: Food Insecurity Experience Scale (FIES).

**Description:** The sub-indicator on Food Insecurity Experience Scale (FIES) is a measure of the severity of food insecurity experienced by individuals or households. The proportion of sustainable (non-sustainable) agricultural area by this indicator is calculated by accounting for the area associated with household farms that do not experience food insecurity.

**Sustainability criteria:** The following sustainability criteria have been adopted to classify the agricultural area of the household farm by sustainability status:

- **Green (desirable):** the household farm has mild food insecurity
- **Yellow (acceptable):** the household farm has moderate food insecurity
- **Red (unsustainable):** the household farm has severe food insecurity

**Calculation steps:** Information on the severity of food insecurity experienced by agricultural households is gathered from household surveys containing the 8 standardized FIES questions. The 8 FIES questions allow capturing a specific item, which is latter associated with a certain degree of severity of food insecurity.

**Table. Items, domain and assumed severity of food insecurity**

FIES order of items	Variables	Variable description	Domains of the food insecurity	Assumed severity of food insecurity
1	Worried	Felt anxiety about having enough food at any time during the previous 12 months	uncertainty and worry about food	Mild
2	Healthy	Not able to eat healthy and nutritious food because of lack of money or other resources to get food	insufficient food quantity	Mild
3	Few food	Consumed a diet based on only few kinds of foods because of lack of money or other resources to get food	insufficient food quantity	Mild



FIES order of items	Variables	Variable description	Domains of the food insecurity	Assumed severity of food insecurity
4	Skipped	Did not eat breakfast, lunch or dinner [or skipped a meal] because there was not enough money or other resources to get food	insufficient food quantity	Moderate
5	Ateless	Ate less than they thought they should because of lack of money or other resources to get food	insufficient food quantity	Moderate
6	Runout	Household ran out of food because of lack of money or other resources to get food	insufficient food quantity	Moderate
7	Hungry	Felt hungry but didn't eat because there was not enough money or other resources for food	insufficient food quantity	Severe
8	Whlday	Went without eating for a whole day	insufficient food quantity	Severe

The methodology to calculate SDG indicator 2.1.2 on the severity of food insecurity is used. SDG indicator 2.1.2 provides estimates of the proportion of household farms facing moderate or severe difficulties in accessing food. Specifically, the approach used to analyze FIES data comes from Item Response Theory (IRT), a branch of statistics that permits the measurement of unobservable traits through analysis of responses to surveys and tests.

The Research model provides a theoretical base and a set of statistical tools to 1) assess the suitability of a set of survey questions (“items”) for constructing a measurement scale and to 2) compare a scale’s performance across different populations and survey contexts.

The logic behind the Rasch model is that the likelihood of a respondent reporting an experience depends on the distance along the scale between the severity of that respondent and that of the item associated with that experience. The more severe a respondent's food insecurity is, relative to that of the item, the more likely they are to answer "yes" (give an affirmative response). In other words, the higher the probability to say “yes” to a specific question, the more severe a respondent’s food insecurity is relative to that item, which means that the more severe the food insecurity of given respondent, the higher the probability will respond “Yes”. The Rasch model can be formalized as follows:

The relative severity associated with each of the experiences (the parameters  $\beta_i$  in the formula above) can be inferred from the frequency with which they are reported by a large sample of respondents, assuming that, all else being equal, more severe experiences are reported by fewer respondents. Once the severity of each experience is estimated, the severity of a respondent’s condition (the  $\theta_h$  parameter) can be computed by noting how many of the items have been affirmed. The rationale for this is that, on average, it is expected that a respondent will answer affirmatively to all questions that refer to experiences that are less severe of their food insecurity situation, and negatively to questions that refer to situations that are more severe.

The Rasch model concerns estimates of the parameters of the raw score. The raw score is the number of affirmative responses given to the eight FIES questions. A respondent's raw score is the basis for calculating the respondent parameter.

Program R or Statistical Program such as SPSS (Statistical Package for the Social Science) can be used for parameters estimation of the Rasch model.

The probability of a respondent getting the item correct given their ability level will be calculated. For example, for item Few foods, the estimator will show that a household has something like a .... % Probability of getting to say “yes” (predicted).

The final step is aimed at calculating the proportion of sustainable agricultural area by sustainability status. This is done by adding up the total agricultural area associated with farms classified as having a given sustainability status (green, yellow or red) in total agricultural area. It is important to notice that the final sub-indicator only accounts for the agricultural area associated with household farms.

### **Sub-indicator 11: Secure Tenure Rights to Land**

**Description:** The sub-indicator measures ownership or secure rights over use of agricultural land areas using the following criteria:

- Formal document issued by the Land Registry/Cadastral Agency
- Name of the holder listed as owner/use right holder on legally recognized documents
- Rights to sell any of the parcel of the holding
- Rights to bequeath any of the parcel of the holding

**Sustainability criteria:** The following sustainability criteria have been adopted to classify the agricultural area of the household farm by sustainability status:

- **Green (desirable):** has a formal document with the name of the holder/holding on it, or has the right to sell any of the parcel of the holding, or has the right to bequeath any of the parcel of the holding
- **Yellow (acceptable):** has a formal document even if the name of the holder/holding is not on it
- **Red (unsustainable):** no positive responses to any of the 4 questions above

**Calculation steps:** the calculation procedure for this indicator are:

**Step 1:** Classification of farms by sustainability status on the basis of the following criteria of the above-mentioned sustainability criteria.

**Step 2:** Once farms have been classified according to their sustainability status (sustainable, acceptable and unsustainable), the proportion of agricultural area by sustainability status can be derived accordingly. This is done by adding up the total agricultural area associated with farms classified as having a given sustainability status (green, yellow or red) in total agricultural area.

## Chapter 4 Results and interpretation

This chapter summarizes and describes the analysis of survey results from 220 households in Battambang province, Cambodia associated with each sub-indicator of the SDG indicator 2.4.1 and the relationship with main factors that affect to households' operation and their production by descriptive analysis in Economics, Environment and Social dimension. Final results of each sub-indicator of SDG 2.4.1 will be and presented in a dashboard.

DPS team has conducted a pilot survey in 3 districts (Banan, Thma koul and Bavel) of Battambang Province during 24-30 January 2022. Sampling frame was selected from DAO listing in year 2021. The target populations were randomly selected 220 samples from 3,588 farm households in 26 villages with the same percentages by activity from the DAO list. In this survey, we use PAPI to collect data for 154 samples (70%) and CAPI for 66 samples (30%).

### 4.1 Results of the Survey

The main purpose for descriptive analysis is to understand the profile of the farm households, how they operated, and understand of production and farm households' main agricultural activities for the detail as below:

**Table 1:** characteristics of respondents

Item	Number	Percent (%)
N=220		
<b>Gender</b>		
Male	179	81.4
Female	41	18.6
<b>Agricultural holding role</b>		
Holder	220	100.0
<b>Household's Main agricultural</b>		
Mainly crop production	124	56.4
Mainly livestock production	10	4.5
Mix of the crop and livestock	86	39.1
<b>Holding use water to irrigate crops</b>		
Holding that was irrigated	99	45.0
don't need irrigation	22	10.0
can't afford irrigation	44	20.0
no water available	55	25.0
<b>Applications that helping you on farming</b>		
Application Usage	30	13.6
- Tonlesap App (AMK)	(1)	(3.3)
- Guide to Raising Pigs	(1)	(3.3)
- MAFF News (MAFF)	(1)	(3.3)
- Camagri Market (MAFF)	(0)	(0)
- ARDB HRMS	(0)	(0)
- Other (YouTube, Facebook, and etc.)	(27)	(90.0)
No Application Usage	190	86.4

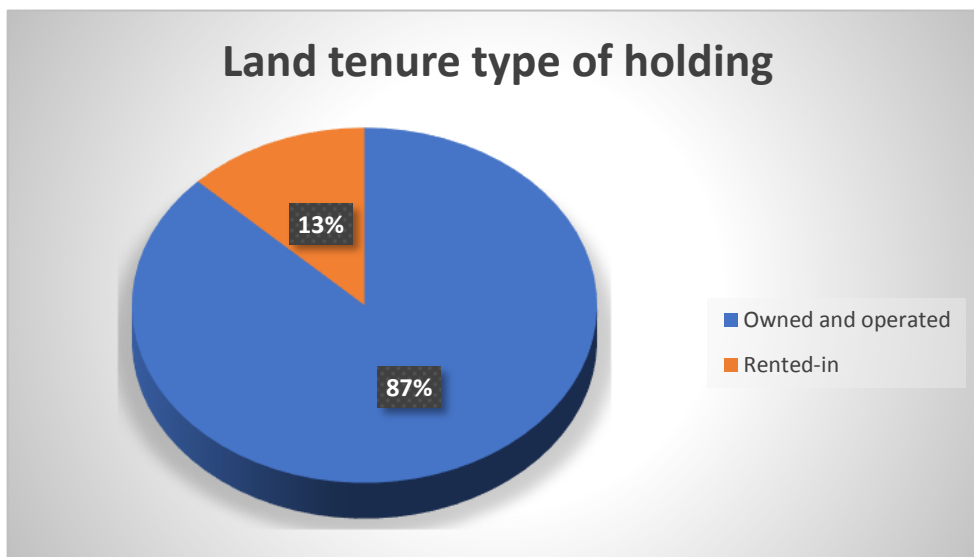


Figure 1: Type of holding land tenure

#### 4.2 SDG 2.4.1 Proportion of agricultural area under productive and sustainable agriculture

The proportion of agricultural area under productive and sustainable agriculture is measured using the extent of both land under productive and sustainable agriculture. This chapter reports sustainability results of 3 dimension consists of 11 themes and sub-indicators which collected during the pilot survey in Battambang province in section a-c. The set of sub-indicators are presented in the form of a dashboard in section d.

Although, the total number of samples are 220 household in scope of the survey and will be used to calculate for each sub-indicators of SDG 2.4.1. Hence, this survey results do not represent in the provincial level as this study is estimate the results based on small sample size (220 households)

##### 4.2.1. Economics dimension

Economics dimension of the SDG indicator 2.4.1 consists of 3 themes: 1) land productivity, 2) profitability, and 3) resilience. The sub-indicator used to calculate these themes are farm output value per hectare, net farm income, and risk mitigation mechanism, respectively. The pilot survey results of each term and sub-indicator are reported as follows.

##### 1) Land productivity (Sub-indicator 1: Farm output value per hectare)

Land productivity theme is determined from sub-indicator 1 farm output value per hectare, which calculated from the total value of production of each agricultural holding divided by agricultural land area. The 90th percentile value of 220 samples is 16,078,416.9 riel per hectare, thus the threshold of unsustainable status is less than 1/3 (5,359,472.3 riel per hectare) of the 90th percentile, the threshold of acceptable status is greater than 1/3 (5,359,472.3 riel per hectare) and less than 2/3 (10,718,944.6 riel per hectare) of the 90th percentile and desirable status is greater than or equal to 2/3 (10,718,944.6 riel per hectare) of the 90th percentile. The farm values per hectare results of Battambang province shows that 23.05 ha (1.9%) is classified as desirable, 201.05 ha (16.6%) is classified as acceptable, and the rest (985.90 ha or 81.5 %) is classified as unsustainable as table 3 below.



**Table 2** Sustainability status of economics dimension, land productivity theme

Indicator	Area	Ratio
Desirable	23.05	1.9
Acceptable	201.05	16.6
Unsustainable	985.90	81.5
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

We also calculate the results according to the FAO manual (Guidelines on Data Analysis and Reporting) by categorized farm in 12 categories; a) household and non-household sectors, b) main type of production and c) whether or not they irrigate the agricultural area. However, the survey results show that there are only 5 categories according to a pilot survey in Cambodia because there is no non-household sector in 220 samples.

**Table 3:** Category of farm

No.	Category of farms	Number of HH
1	Crop, HH sector, irrigation	53
2	Livestock, HH sector, irrigation	-
3	Mixed, HH sector, irrigation	46
4	Crop, HH sector, non-irrigation	71
5	Livestock, HH sector, non-irrigation	10
6	Mixed, HH sector, non-irrigation	40
7	Crop, <b>non-HH sector</b> , irrigation	-
8	Livestock, <b>non-HH sector</b> , irrigation	-
9	Mixed, <b>non-HH sector</b> , irrigation	-
10	Crop, <b>non-HH sector</b> , non-irrigation	-
11	Livestock, <b>non-HH sector</b> , non-irrigation	-
12	Mixed, <b>non-HH sector</b> , non-irrigation	-
<b>Total</b>		<b>220</b>

Table 4 below shows the overall results of 6 categories using category of farm classification. It shows that 216.39 ha (17.9 %) is classified as desirable, 487.68 ha (40.3%) is classified as acceptable, and the rest (505.93 ha or 41.8) is classified as unsustainable

**Table 4:** Overall result of sub-indicator 1 based on category of farm

Indicator	Area	Ratio
Desirable	216.39	17.90
Acceptable	487.68	40.30
Unsustainable	505.93	41.80
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

Table 5 below shows results of category of farm classification (Crop, HH use irrigation). The 90th percentile value of 53 samples is 40,000,000.0 riel per hectare, thus the threshold of unsustainable status is less than 1/3 (13,333,333.3 riel per hectare) of the 90th percentile, acceptable status is greater than 1/3 (13,333,333.3 riel per hectare) and less than 2/3 (26,666,666.7 riel per hectare) of the 90<sup>th</sup> percentile and the threshold of desirable status is greater than or equal to 2/3 (26,666,666.7 riel per hectare) of the 90th percentile. According to table below, it shows that 4.16 ha (2.3 %) of category of crop, HH, and use

irrigation is classified as desirable, 6.57 ha (3.6 %) is classified as acceptable, and the rest 170.88 ha (94.1%) is classified as unsustainable

**Table 5:** Category no.1: Crop HH sector, irrigation (53 households)

<b>Indicator</b>	<b>Area</b>	<b>Ratio</b>
<b>Desirable</b>	4.16	2.3
<b>Acceptable</b>	6.57	3.6
<b>Unsustainable</b>	170.88	94.1
<b>Total</b>	<b>181.61</b>	<b>100.0</b>

For category no. 2 (Livestock, HH sector, irrigation), it is not present because there are no livestock farm households that have irrigation.

Table 6 below shows the result of the category of farm classification of Mixed, HH sector and use irrigation. The 90th percentile value of 46 samples is 17,060,281.8 riel per hectare, thus the threshold of unsustainable status is less than 1/3 (5,686,760.6 riel per hectare) of the 90th percentile, acceptable status is greater than 1/3 (5,686,760.6 riel per hectare) and less than 2/3 (11,373,521.2 riel per hectare) of the 90th percentile and the threshold of desirable status is greater than or equal to 2/3 (11,373,521.2 riel per hectare) of the 90th percentile. The results show that 5.97 ha (2.0 %) is classified as desirable, 85.54 ha (28.1%) is classified as acceptable, and the rest 212.58 ha (69.9%) is classified as unsustainable.

**Table 6:** Category No. 3: Mixed, HH sector, irrigation (46 households)

<b>Indicator</b>	<b>Area</b>	<b>Ratio</b>
<b>Desirable</b>	5.97	2.0
<b>Acceptable</b>	85.54	28.1
<b>Unsustainable</b>	212.58	69.9
<b>Total</b>	<b>304.09</b>	<b>100.0</b>

Table 7 below shows the result of the category of farm classification of Crop HH non-irrigation. The 90th percentile value of 71 samples is 3,985,389.6 riel per hectare, thus the threshold of unsustainable status is less than 1/3 (1,328,463.2 riel per hectare) of the 90th percentile, acceptable status is greater than 1/3 (1,328,463.2 riel per hectare) and less than 2/3 (2,656,926.4 riel per hectare) of the 90th percentile, and the threshold of desirable status is greater than or equal to 2/3 (2,656,926.4 riel per hectare) of the 90th percentile. The results show that 112.30 ha (22.5%) is classified as desirable, 332.75 ha (66.8%) is classified as acceptable, and the rest 53.41 ha (10.7%) is classified as unsustainable

**Table 7:** Category No. 4: Crop, HH sector, non-irrigation (71 households)

<b>Indicator</b>	<b>Area</b>	<b>Ratio</b>
<b>Desirable</b>	112.30	22.5
<b>Acceptable</b>	332.75	66.8
<b>Unsustainable</b>	53.41	10.7
<b>Total</b>	<b>498.46</b>	<b>100.0</b>

Table 8 below shows the result of the category of farm classification of livestock HH sector non-irrigation. The 90th percentile value of 10 samples is 127,500,000.0 riel per hectare, thus the threshold of unsustainable status is less than 1/3 (42,500,000 riel per hectare) of the 90th percentile, acceptable status is greater than 1/3 (42,500,000 riel per hectare) and less than 2/3 (85,000,000 riel per hectare) of the 90th percentile and the threshold of desirable status is greater than or equal to 2/3 (85,000,000 riel per hectare) of the 90th percentile. It shows that 0.66 ha (17.4%) is classified as desirable, 0.13 ha (3.3 %) is classified as acceptable, and the rest (3.01 ha or 79.3%) is classified as unsustainable.

**Note:** These 10 households have only a few of land area for raising livestock, so it is impossible to calculate the percentage of 'desirable', 'acceptable' and 'unsustainable' by using land area. Therefore, the area of 'farm buildings and land under farmland' is used in this calculation

**Table 8:** Category No. 5: Livestock, HH sector, non-irrigation (10 households)

Indicator	Area	Ratio
Desirable	0.66	17.4
Acceptable	0.13	3.3
Unsustainable	3.01	79.3
<b>Total</b>	<b>3.80</b>	<b>100.0</b>

Table 9 below shows the result of the category of farm classification of mixed HH sector non-irrigation. The 90th percentile value of 40 samples is 7,195,374.0 riel per hectare, thus the threshold of unsustainable status is less than 1/3 (2,398,458.01 riel per hectare) of the 90th percentile, acceptable status is greater than 1/3 (2,398,458.01 riel per hectare) and less than 2/3 (4,796,916.01 riel per hectare) of the 90th percentile and the threshold of desirable status is greater than or equal to 2/3 (4,796,916.01 riel per hectare) of the 90th percentile. The results show that 93.30 ha (42.0%) is classified as desirable, 62.70 ha (28.1 %) is classified as acceptable, and the rest 66.04 ha (29.7%) is classified as unsustainable

**Note:** the area of "Land under farm buildings and farmyards" is used for calculate 'livestock only' in category of farm

**Table 9:** Category No. 6: Mixed, HH sector, non-irrigation (40 farms)

Indicator	Area	Ratio
Desirable	93.30	42.0
Acceptable	62.70	28.2
Unsustainable	66.04	29.7
<b>Total</b>	<b>222.04</b>	<b>100.0</b>

## 2) Profitability (Sub-indicator 2: Net farm income)

Profitability theme is determined from net farm income of 3 consecutive years. If respondents have net farm income above zero for the past 3 consecutive years, the desirable status will be assigned. If respondents have net farm income above zero for at least 1 of the past 3 consecutive years, the

acceptable status will be assigned. On the other hand, the unsustainable status will be assigned, if the respondent does not have net farm income for all 3 years.

Results from the pilot survey show that 277.11 ha (22.9 %) of the agricultural area is classified as desirable. 721.35 ha (59.6 %) is classified as acceptable, and the rest (211.54 ha or 17.5 %) is classified as unsustainable. The results show sustainable area are high, because the farmgate price of rice, cassava, and natural rubber in last 2 years are satisfied, but there is no specific figure for how much profit they made.

**Table 10: Sustainability status of economics dimension, Profitability them**

<b>Indicator</b>	<b>Area</b>	<b>Ratio</b>
<b>Desirable</b>	<b>277.11</b>	<b>22.9</b>
<b>Acceptable</b>	<b>721.35</b>	<b>59.6</b>
<b>Unsustainable</b>	<b>211.54</b>	<b>17.5</b>
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

### 3) Resilience (Sub-indicator 3: Risk mitigation mechanisms)

Resilience theme is determined from risk mitigation mechanisms. In this theme, the respondents were asked whether they are practice or are able to access any of 3 factors related to risk mitigation mechanisms; 1) credit accessibility, 2) insurance accessibility and 3) on-farm diversification of the household to protect against external shocks. The desirable status will be assigned if all 3 mechanisms are available or accessible by the respondent. In case, the respondent has access at least 1 mechanism, it will be considered as acceptable. Otherwise, the unsustainable status will be assigned if they are not access any listed mitigation mechanisms. According to a pilot survey, 199.11 ha of the agricultural area (16.5 %) is classified as desirable. 536.96 ha (44.4 %) is classified as acceptable, and the rest (473.92 ha or 39.1%) is classified as unsustainable.

**Table 11: Sustainability status of economics dimension, resilience theme**

<b>Indicator</b>	<b>Area</b>	<b>Ratio</b>
<b>Desirable</b>	<b>199.11</b>	<b>16.5</b>
<b>Acceptable</b>	<b>536.96</b>	<b>44.4</b>
<b>Unsustainable</b>	<b>473.92</b>	<b>39.2</b>
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

#### 4.2.2 Environmental dimension

Environmental dimension in the SDG indicator 2.4.1 consists of 5 themes: 1) soil health, 2) water use, 3) fertilizer risk, 4) pesticide risk, and 5) biodiversity. The sub-indicator used to calculate these themes are; prevalence of soil degradation, variation in water availability, management of fertilizers, management of pesticides, and use of agro-biodiversity supportive practice, respectively. The pilot survey results of each term and sub-indicator are reported as follows;



### 1) Soil health (Sub-indicator 4: Prevalence of soil degradation)

Prevalence of soil degradation sub-indicator will be used for soil health determination. There are 4 soil degradation threats; 1) soil erosion, 2) reduction in soil fertility, 3) salinization, and 4) waterlogging; were considered for this sub indicator which represent a sustainability issue. The threshold of this sub-indicator is determined from the area that is affected by the soil degradation threat. If one or more of these threats occur, the total agricultural area that is affected by these threats will be asked. If less than 10 % of the total agricultural area is affected by the soil degradation threat, then the desirable status will be assigned. If the affected area is equal or higher than 10 % but not more than 50 % of the total agricultural area, the acceptable status will be assigned. In case, the area affected by any of 4 threats is over 50%, the unsustainable status will be assigned.

According to a pilot survey, the acid sulfate soil and fungal disease also been reported by the respondent as the soil degradation threat apart from 4 main threats in the questionnaire (soil erosion, reduction in soil fertility, salinization of irrigation land, and waterlogging).

Out of 220 respondents, 299.07 ha of the agricultural area (24.7 %) is classified as desirable. 220.26 ha (18.2%) is classified as acceptable, and 690.66 ha (57.1 %) is classified as unsustainable. For unsustainable area, most of them have a decline in soil fertility problem. Soil fertility decline occurs when the quantities of nutrients removed from the soil in harvested products exceed the quantities of nutrients being applied. In this situation, the nutrient requirements of the crop are met from soil reserves until these reserves cannot meet crop demands. This results in a reduction of plant growth and yield.

**Table 12: Sustainability status of environmental dimension, soil health them**

<b>Indicator</b>	<b>Area</b>	<b>Ratio</b>
<b>Desirable</b>	299.07	24.7
<b>Acceptable</b>	220.26	18.2
<b>Unsustainable</b>	690.66	57.1
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

### 2) Water use (Sub-indicator 5: Variation in water availability)

In this theme, the variation of water availability will be considered for the water usage status of respondents. The sustainability status will be estimated by the irrigated area and the stability of water level of the respondent's agricultural area including the availability of organizations that are responsible for water allocation in those area.

The desirable status will be assigned if the irrigated area is less than 10 % or the water availability remain stable over the years for the farm that have more than 10% of irrigated area. However, in case respondents experienced instability of water level over the years but there are organizations which are responsible for water allocation, the acceptable status will be assigned. Apart from those criteria, they will be considered as unsustain.

According to the pilot survey results, 756.98 ha of the total agricultural area (62.6 %) has desirable status. 32.10 ha (2.7%) has acceptable status, and 420.91 ha (34.8 %) has unsustainable status. From the interview, most of agricultural area in Battambang province does not use the irrigation system.

**Table 13:** Sustainability status of environmental dimension, water use theme

Indicator	Area	Ratio
Desirable	756.98	62.6
Acceptable	32.10	2.7
Unsustainable	420.91	34.8
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

### 3) Fertilizer risk (Sub-indicator 6: Management of fertilizers)

There are 8 measures regarding the respondent's behavior associated with fertilizer and manure applications, assigned by FAO in fertilizer pollution risk measurement. The desirable status will be assigned, if the farm adopted at least 4 measures. If at least 2 or 3 measures were adopted, the acceptable status will be assigned. On the contrary, the unsustainable status will be assigned, if a farmer applied fertilizer and does not take any measures to help reducing risk.

The result shows that 221.87ha (18.3 %) of the agricultural area adopts at least 4 measures, which considered as desirable status. Followed by 496.22 ha (41.0 %) of acceptable status which is considered as the majority and 491.91ha or 40.7% of the total agricultural area are considered to be unsustainable as they adopt only one measure or does not take any measures.

**Table 14:** Sustainability status of environmental dimension, fertilizer risk theme

Indicator	Area	Ratio
Desirable	221.87	18.3
Acceptable	496.22	41.0
Unsustainable	491.91	40.7
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

### 4) Pesticide risk (Sub-indicator 7: Management of pesticides)

Pesticide management sub-indicator is considered by the adoption of 10 measurements consist of 3 health-related measures and 7 environment-related measurements. At first, types of pesticide will be considered to evaluate this sub indicator's sustainability status. In case farmers use highly or extremely hazardous pesticide, or use illegal pesticide, they will be assigned as unsustainable status straight away. For farmers who use moderately, or slightly hazardous pesticides and they adopted all 3 health-related measures and at least 4 or more of environment-related measures, the desirable status will be assigned to those particular farmers. In case, they adopted only 2 or 3 measures from health and environment related measures, the acceptable status will be assigned. However, even if there are farmers who use moderately or slightly hazardous pesticides, but they adopted less than 2 measures of health and environment related measures, they will be considered as unsustainable status.

The result from the pilot survey shows that 383.11 ha of the agricultural area (31.7%) has desirable status, followed by the acceptable status at 287.69 ha (23.8%). The unsustainable status has the least share at 539.19 ha (44.6%). According to survey results, some farmers do not aware of the

environmental risks associated with the use of pesticides as they still use highly or extremely hazardous pesticides, or illegal pesticides for their crop production.

**Table 15:** Sustainability status of environmental dimension, pesticide risk theme

Indicator	Area	Ratio
Desirable	383.11	31.7
Acceptable	287.69	23.8
Unsustainable	539.19	44.6
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

#### 5) Biodiversity (Sub-indicator 8: Use of agro-biodiversity-supportive practices)

Use of AGRO-biodiversity-supportive practices (UBSP) sub-indicator is used for biodiversity theme measurement. This sub-indicator is measured differently depending on whether (or not) the country has the applicability of the organic certification system. In Cambodia, the organic certification is provided by the General Director of Agriculture (GDA) of Ministry of Agriculture, Forestry and Fisheries. Hence, the threshold of sustainability criteria for countries with organic certificates will be used for sustainability status evaluation. Desirable status will be assigned if the agricultural holding meets at least 3 out of 6 criteria. Acceptable status will be assigned if the agricultural holding meets at least 2 of 6 criteria. However, the unsustainable status will be assigned if the agricultural holding meets none of 6 criteria.

The majority of the pilot survey results have unsustainable status which is 787.52 ha of the agricultural area (65.1%), followed by 336.21 ha of agriculture area (27.8%) with the acceptable status and 86.26 ha with the desirable status (7.1%).

**Table 16:** Sustainability status of environmental dimension, biodiversity theme

Indicator	Area	Ratio
Desirable	86.26	7.1
Acceptable	336.21	27.8
Unsustainable	787.52	65.1
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

#### 4.2.3. Social dimension

Social dimension of the SDG indicator 2.4.1 consists of 3 themes: 1) decent employment, 2) food security, and 3) land tenure. The sub-indicator used to calculate these themes are; wage rate in agriculture, Food Insecurity Experience Scale (FIES), and secure tenure rights to land, respectively. The pilot survey results of each term and sub-indicator are reported as follows.

##### 1) Decent employment (Sub-indicator 9: Wage rate in agriculture)

This theme investigates unskilled labor's economic risks in terms of remuneration received which measured the unskilled labor's daily wage in local currency unit to the national or agriculture sector minimum wage rate. In this survey, the minimum wage rate proposed by the government Cambodia will be used for result evaluation. The minimum wage rate per day of Battambang province is average

26,244 riel, this will be set as a threshold for assigning sustainability status. If the wage rate of unskilled labor is higher than 26,244 riels, the desirable status will be assigned. If the wage rate is equals to 26,244 riels, the acceptable status will be assigned. However, if the wage rate is lower than 26,244 riels, it will be considered as unsustain.

According to the survey result, most of the respondents have the desirable status (1203.99 ha of the agricultural area or 99.5 %), the rest (6 ha or 0.5 %) have an unsustainable status. For an acceptable status, no respondent falls under these criteria. The survey shows that most of household samples hire agricultural workers because of their aging.

**Table 17:** Sustainability status of social dimension, decent employment theme

Indicator	Area	Ratio
Desirable	1203.99	99.5
Acceptable	0.00	0.0
Unsustainable	6.00	0.5
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

## 2) Food security (Sub-indicator 10: Food Insecurity Experience Scale (FIES))

This sub-indicator is meant to measure the severity of food insecurity experienced by the households of the holding, based on direct interviews. According to the pilot survey, all 1209.99 ha of the agricultural area.

According to the survey result, most of the respondents have the desirable status (876.82 ha of the agricultural area or 72.5 %), 324.60 ha of agriculture area (26.8 %) with the acceptable status and 8.58 ha with the unstainable status (0.7 %).

**Table 19:** Sustainability status of social dimension, food security theme

Indicator	Area	Ratio
Desirable	876.82	72.5
Acceptable	324.60	26.8
Unsustainable	8.58	0.7
<b>Total</b>	<b>1209.99</b>	<b>100.0</b>

## 3) Land tenure

For this theme, the secure tenure rights to land sub-indicator will be considered for the sustainability status assignment. There are 4 criteria used for considering the level of security of land access; 1) formal document 2) name of the holder/holding on the document 3) right to sell any of parcel, and 4) right to bequeath any of parcel. If all 4 criteria are applied, the desirable status will be assigned.

If famers have formal documents but other criteria do not apply, the acceptable status will be assigned. On the contrary, if there are no positive response to any of 4 criteria, the unsustainable status will be assigned. According to the survey result, 1190.06 ha of the agriculture land (98.4 %) is considered as the desirable status. For the acceptable status, only 0.70 ha (0.1%) is reported, the rest (19.23 ha or 1.6%) falls under the unsustainable status.



**Table 20:** Sustainability status of social dimension, land tenure theme

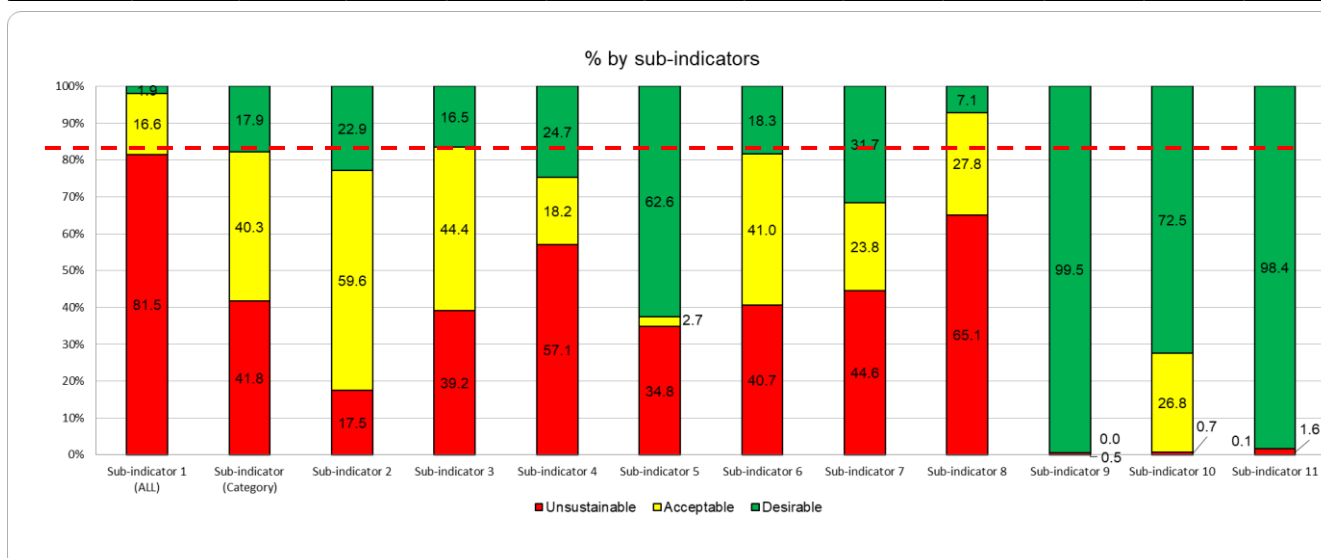
Indicator	Area	Ratio
Desirable	1190.06	98.4
Acceptable	0.70	0.1
Unsustainable	19.23	1.6
<b>Total</b>	<b>1209.99</b>	<b>100.1</b>

#### 4.2.4 SDG 2.4.1 Dashboard

Using data from the pilot survey carried out in Battambang province, it is unmistakable that the sub-indicator with the highest level of unsustainability is Farm Output Value per Hectare with at least 81.5% of the agricultural area classified as unsustainable. However, it should be noted that if sub-indicator 1 is calculated based on "category of farm" according to the FAO Manual, the percentage of "unsustainable" in sub-indicator 8 "Biodiversity," will be high. Therefore, the overall aggregate indicator of the Battambang province which has the highest percentage of "unsustainable" is sub-indicator 8 (biodiversity).

**Table 21:** The proportion of agricultural areas in total agricultural area that is desirable, acceptable, and unsustainable for each sub-indicator

Item	Sub-indicator 1 (ALL)	Sub-indicator (Category)	Sub-indicator 2	Sub-indicator 3	Sub-indicator 4	Sub-indicator 5	Sub-indicator 6	Sub-indicator 7	Sub-indicator 8	Sub-indicator 9	Sub-indicator 10	Sub-indicator 11
Desirable	1.9	17.9	22.9	16.5	24.7	62.6	18.3	31.7	7.1	99.5	72.5	98.4
Acceptable	16.6	40.3	59.6	44.4	18.2	2.7	41.0	23.8	27.8	0.0	26.8	0.1
Unsustainable	81.5	41.8	17.5	39.2	57.1	34.8	40.7	44.6	65.1	0.5	0.7	1.6
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
Sustainability status of the holding	Farm output value per hectare	Farm output value per hectare (Category)	Net farm income	Risk mitigation mechanisms	Prevalence of soil degradation	Variation in water availability	Management of fertilizers	Management of pesticides	Use of agrobiodiversity	Wage rate in agriculture	FIES	Secure tenure rights to land



**Figure 1:** Final dashboard

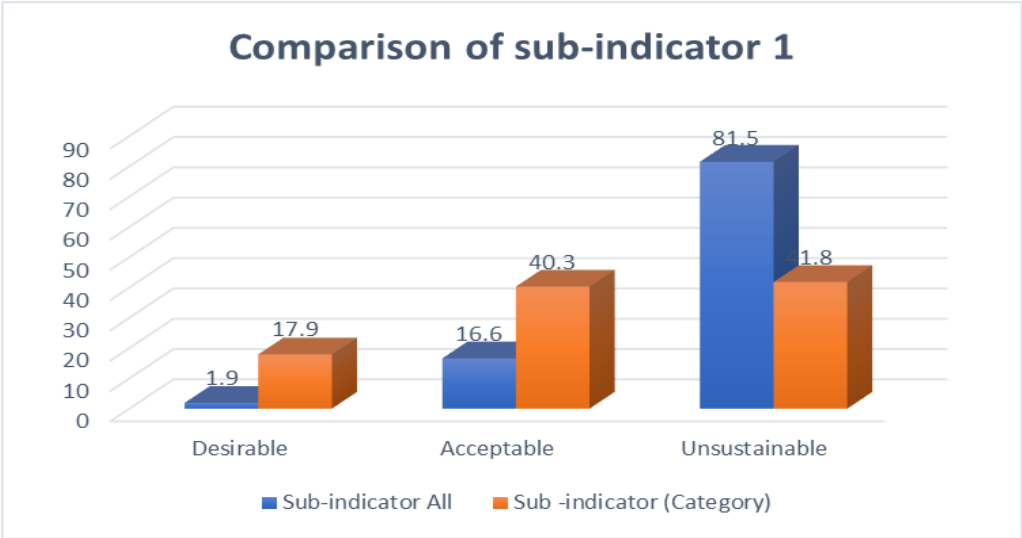
**Sub-indicator 1 (Farm output value per hectare),** the result from 220 samples shows that Sub-indicator 1 have has high percentage of unsustainable (81.5%) and this result was largely influenced by the fact that many main crop farmers with medium and large areas of agricultural land had low farm

output value per hectare. This may be due to a lack of management and lower productivity as the size of the farm increases. Also, during Covid-19, the cost of agricultural inputs was high (fertilizer, pesticide, transportation operations and etc.) which affected to soil degradation and technical practices are still limited.

Moreover, a small number of farmers producing mainly fruit, but not main crops such as rice, cassava, vegetables and livestock/poultry, harvested small quantities and some harvested for the first time. Also, most of households raised livestock in small scale and livestock production some household just sold and face difficulties in selling livestock production. And most farmers consume part of their production for their self-consumption. For the purposes of this survey, the part of the self-consumed should be considered as sold and the amount should be included in the sales value. However, most farmers were unable to estimate the value of produce self-consumed due to the fact that they did not know the amount of produce they consumed on their own and cannot give appropriate answers. The calculation was based on a low sales value that did not include the amount of self-consumption, rather than the sales value that should have been captured, which is thought to be one of the reasons why the proportion of 'unsustainable' farmers increased. This result would be even better if the survey target included large farmers and high productivity in the non-household sector.

Then, we've calculated the 90th percentile by using the "category of farm" classification according to FAO manual by divided samples into 12 categories; a) household and non-household sectors, b) main type of production and c) whether or not they irrigate the agricultural area. The 90th percentile will be set for each category to estimate different thresholds for productivity by category of farms and then in turn assess the sustainability.

As a results, there are only 5 categories according to a pilot survey in Cambodia because there is no non-household sector in 220 samples. If we use category of farm classification, there will be more households that were determined as "desirable" than the calculation of 90th percentile from all samples because thresholds are set for each category. If national surveys are conducted in the future, it is necessary to calculate using the 'category of farm' in accordance with FAO rules.



**Figure 2:** Comparison of Sub-indicator 1 results (table 3 and table 5)

Calculation without "category of farm": Desirable 1.9, Acceptable 16.6, Unsustainable 81.5

Calculation using "category of farm": Desirable 17.9, Acceptable 40.3, unsustainable 1.8

**Sub-indicator 3 (resilient)**, the unsustainable status accounted for 39.2%. Cambodia farmers don't access to the listed mitigation mechanisms and resilient or has availed to access the risk mitigation mechanisms as they should be. It is necessary to provide guidance to farmers and strengthen publicity through the local government officials to ensure that farmers are fully to access the risk mitigation mechanisms.

**Sub-indicator 4 (Prevalence of soil degradation)** the unsustainable 57.1 %. The result shows that most of farm have a decline in soil fertility problem which is considered as a large percentage. When the quantities of nutrients removed from the soil in harvested products exceed the quantities of nutrients being applied. In this situation, the nutrient requirements of the crop. It is necessary guide to the farmer on soil structure improvement to use of organic matter (OM) to increase the activity of microorganisms and improve the shape of the soil, provide nutrients to help the process of humidification, increase the water storage capacity of the soil if it is sandy and increase the air flow and water in the soil. In case of clay, they need to apply other organic matter (straw or rubber) to the soil, use calcium, good water management used, plowing to cover old crop residues in the soil to increase OM as well as increase crop growth and productivity.

**Sub-indicator 6 (Management of fertilizer)**, the unsustainable status accounted for 40.7. Since farmers use fertilizer and chemicals and they do not take any of measurement to mitigate environmental risks associated with their use for increase the productivity as it should be. It is necessary to provide guidance to farmers and strengthen publicity through the local government officials to ensure that farmers are fully aware of the fertilizer risks and also limit the impact on their health to mitigate environmental risks.

**Sub-indicator 7 (Management of Pesticides)**, the unsustainable status accounted for 44.6%. Since Cambodia farmers use pesticides and chemicals more than necessary and it does not increase the productivity as it should be, it is necessary to provide guidance to farmers and strengthen publicity through the local government officials to ensure that farmers are fully aware of the pesticide risks and also limit the impact on their health and on the environment.

**Sub-indicator 8 (Use of agro-biodiversity-supportive practices)** has unsustainable agricultural area at 65.1%, which is also considered as a large percentage. Based on the results, this may be due to a large farm size of the holding that have at least two different crops or pastures rotation which is more difficult in farm management than planting only one crop. In addition, there are limitation in adopting new technologies and increase productivity since most of farmers are traditional and small scale.

## **Chapter 5 Conclusion and recommendation**

### **5.1 Conclusion**

The information in this study points out some of the key results of agricultural sector in Cambodia.

#### **5.1.1 Characteristics of Respondents**

The majority of respondents are male 81.4% while 18.6 % are female. The role of the holding is holder 100.0% which mainly focus on crop production 56.4%, on livestock production 4.5%, and mixed of crop and livestock 39.1% and use irrigation 45.0%, non-irrigation 55.0%.

The respondents were adult of family member (18 years or older) of the household and knowledgeable of the agricultural holding's activities. The most qualified respondent was the agriculture holder. However, in his or her absence, the spouse or any son or daughter 18 years or older, could also act as the respondent. No household member below 18 years or neighbor or other household was interviewed or asked for the information on the household being surveyed.

#### **5.1.2 Three multidimensional natures: economics, social, and environment**

The empirical results suggested are as follows:

1) In order to ensure a sufficient level of income which is satisfactory to sustain a livelihood of the family farming for unforeseeable future, there is a significant necessity to vigorously improve land productivity, even though, the agricultural holdings can satisfy profitability and risk mitigation mechanisms. These implied that farm households can still sustain their livelihood income generation mechanism and can be adjustable to market volatility and natural shocks.

2) The environment is another discrete aspect to be delineated as the result suggests that natural resources are weakening due to the unappropriated use of pesticides and ineffective management in biodiversity.

3) The social dimension is not deliberately to be concerned in terms of food security and tenure rights, although, there are some possible risks for unskilled labors. There is a labor shortage in the agricultural sector in Cambodia due to the wage gap, and immigrants and foreign workers are meeting the labor demand in this sector.

#### **5.1.3 Sustainability policy**

This paper primarily suggests that to achieve SDG 2.4.1 percentage of agricultural area under sustainable agricultural practices, the improvement for numerators on some sub-indicators mentioned previously requires active policy to sustain life as well as ascertaining land degradation and productivity. In short, in accordance with the development plans of the country, Cambodia should incessantly operationalize efficiency policy on sustainable agriculture practices. In order to link the survey results to policy making, it would be effective to focus policy making on the indicator with the largest 'unsustainable' proportion, which is a weak point i.e. policy making on the promotion of reduced pesticides and organic fertilizers, approval schemes for organic farming, and etc. in this may be



effective if the added value of organic farming in the produce increases farmers' income. It could also help reduce the proportion of 'unsustainable' for organic approvals in sub-indicator 8.

## 5.2 Recommendations and Limitations

- For type of survey, the availability of an appropriate sampling frame is crucial for conducting validated surveys. Basically, because the sampling frame captures the relationship between the target population and the unit of observation. This pilot project although used existed sampling frame, ostensibly there is unavailable sample frame for the non-household sector.
- Even though Battambang has diversified agricultural characteristics, the sample size of 220 is yet too small to characterize the whole province since this pilot survey was conducted in 3 districts (Banan, Thma koul and Bavel districts) of Battambang province as a case study. The sample size was a constraint to capture the actual picture of the agricultural sector at the local level.
- According to initially plan, we planned to have 11 enumerators for data collection but 4 enumerators were unable to conduct a survey as it is difficult to conduct a survey due to the COVID-19 pandemic, for example, tighter policies, cross-border restrictions, mobility restrictions and etc., As a result, they don't have an opportunity to use CAPI and collect data related to SDG 2.4.1.
- The advantage of using PAPI is short preparation time and does not require specialist knowledge to prepare the questionnaire. However, skip pattern of questionnaire quite complex and paper questionnaires cannot automatically change the questions which can cause confusion for enumerators to ask the right questions. Also, it is time-consuming to enter data into the sheets or databases as data is being entered manually and there are possibilities of data entry errors. If the number of samples increases, the time of data entry and entry errors also increase.
- CAPI is a template needs to be designed before data collection which time-consuming and requires specialist knowledge of the application used for the survey. Skip patterns are set up in advance making the survey more efficient and helps assure higher quality data. the enumerators can ask the appropriate questions and data can be easily transferred to the calculation platform which saving time and reducing the possibility of data entry errors because no matter how much the number of samples increases, the working time remains the same and it is not so difficult to transfer data. CAPI should be used for national survey, because the sample size would be much larger than this. The desirable solution would be adaptive plans which could apply instantaneously on unforeseen occurrences.
- SDG 2.4.1 comprehensive results and potential for policy making. It would also be a good way to analyze the responses to the questions rather than only from the survey results in order to link them to policy making. *for example,*
  - If a few respondents who do crop rotation, we should encourage farmers to practice crop rotation and less cultivation of cruciferous crops (rapeseed, cabbage, etc.) to reduce nematode contamination of the soil

- If a few respondents who cultivate legumes, we may suggest them to growing legumes as it fixes nitrogen in in the atmosphere and return it to the soil, thus reducing the use of chemical fertilizers
  - If the government encourage farmers to be more aware of health risks from pesticides, biological pest control and using drones for crop fertilization may be effective.
- It would be more effective if we develop the appropriate policy-making in a small scale first and expand it in a bigger scale to accumulate a track record of effectiveness. The survey found it very difficult for respondents to understand the point that they had to give a monetary value for their self-consumption of what they produced.
  - In case of national surveys, questionnaire should be simplified and easy to understand as it is complex and create a burden for the enumerators and respondents. Also, an independent survey on a national scale just to understand SDG 241 is expected to be difficult to implement from a budgetary, labor and time perspective. It would be more convenient if we add SDG indicator 2.4.1 questions to national questionnaires, such as the Census of Agriculture, AGRIS and etc. If it is possible, the survey should be in-depth survey design with other organizations, such as the ministry that in charge of the survey with FAO or, World Bank, etc.

### **5.3 Future research suggestions**

- Sample size and distribution should be relatively sizeable to define the agricultural sustainability of the whole Cambodia.
- Double sampling design suggested by FAO is essential for conducting the future farm survey. A multi-stratified sampling design by farm size, agricultural activity, land productivity, etc. is essential to improve the accuracy of statistics.
- For questionnaire, the best practices would be (1) the multiple- choice questions would need to be adjusted to suit Cambodia circumstances (2) the questionnaire should be simplified and comprehensible so that it will not be a burden for both numerators and selected respondents.
- Data from farm survey can be supplemented with information from other sources, for example, the data, which has been obtained from agricultural census done by National Institute of Statistics (NIS).
- We need crop cutting survey on permanent crop (rubber, cassava, cashew, nut, mango and etc.) and livestock (Pigs, buffalos, cow, chickens, duck, and etc..) to support SDG 2.4.1
- MAFF should discuss with FAO consultants whether aquaculture sector exclusively should be included in the future survey since the sector is one of the major contributions to the agriculture in Cambodia.
- A pilot survey in Battambang province, there are some farmers who don't have agricultural land (0 ha) area because they do only livestock and they have only area of farm building and farmyards. In this case, the "desirable," "acceptable," and "unsustainable" area percentages cannot be calculated for category of farm in sub-indicator 1. Hence, we used the area of "Land under farm buildings and farmyards" to calculate 'livestock only' of category of farm instead. We may have to consult with FAO regarding these issues.

## **Annexes**

Annex 1 Questionnaire

Annex 2 Enumerator Manual

Annex 3 SDG 2.4.1 Methodological note

Annex 4 List of application used in a survey

# ស្នេហា គោលដៅអភិវឌ្ឍន៍ប្រកបដោយចីរភាព ២.៤.១ (FAO / GSARS Survey Module SDG 2.4.1)

## ព័ត៌មានស្តីពីការអង្កេត

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## ផ្នែកទី ១: សេចក្តីផ្តើមអំពីការអង្កេត និងការកំណត់អត្តសញ្ញាណរបស់អ្នកកាន់កាប់កសិកម្ម

អត្ថបទដែលត្រូវអាន:

ជម្រាបសួរ ខ្ញុំឈ្មោះ: ..... ខ្ញុំធ្វើការនៅ ..... យើងខ្ញុំប្រមូលទិន្នន័យដែលរដ្ឋាភិបាល និងអ្នកពាក់ព័ន្ធដទៃទៀតប្រើប្រាស់សម្រាប់គោលបំណងធ្វើផែនការ។ ខ្ញុំមកទីនេះជួបអ្នក ដើម្បីប្រមូលទិន្នន័យនៅកសិដ្ឋានរបស់អ្នក។ នេះគឺជាផ្នែកមួយនៃការរៀបចំទូទាំងពិភពលោកដើម្បីវាស់ស្ទង់នូវវឌ្ឍនភាពក្នុងវិស័យកសិកម្ម ដែលបានរៀបចំរួមគ្នាជាមួយអង្គការស្បៀងអាហារនិងកសិកម្មនៃអង្គការសហប្រជាជាតិ។ ព័ត៌មានដែលអ្នកផ្តល់នឹងត្រូវបានរក្សាទុកដោយសម្ងាត់ វានឹងត្រូវបានប្រើសម្រាប់គោលបំណងស្ថិតិប៉ុណ្ណោះ ហើយនឹងត្រូវបានដាក់បញ្ចូលជាមួយនឹងការឆ្លើយតបពីកសិករដទៃទៀត ដើម្បីប្រើប្រាស់ក្នុងការបង្កើតកម្មវិធីនិងគោលនយោបាយ ក្នុងការលើកកម្ពស់វិស័យកសិកម្មប្រកបដោយជលិតភាពនិងនិរន្តរភាព។ ការធ្វើសម្ភាសន៍នេះត្រូវចំណាយពេលប្រហែលមួយម៉ោង យើងខ្ញុំសូមកោតសរសើរចំពោះការចូលរួមរបស់អ្នកក្នុងការឆ្លើយសំណួរទាំងនេះ។ ប្រសិនបើអ្នកមានសំណួរអ្វីទាក់ទងនឹងការអង្កេតនេះ អ្នកអាចទូរស័ព្ទមកកាន់លេខដែលបង្ហាញនៅលើប័ណ្ណសម្ភាសន៍របស់អង្គការយើងដែលខ្ញុំទុកឱ្យអ្នកនៅទីនេះ។ ខ្ញុំសូមថ្លែងអំណរគុណចំពោះការចូលរួមរបស់អ្នកនៅក្នុងការស្ទង់មតិនេះជាមុន។

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### » I.1 កត់ត្រាព័ត៌មានខាងក្រោមអំពីអ្នកឆ្លើយតប

#### I.1.1 នាមខ្លួន

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**I.1.2 គោត្តនាម**

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**I.1.3 ភេទរបស់អ្នកឆ្លើយតប**

- ប្រុស
- ស្រី

**I.1.4 តើអ្នកមានតួនាទីអ្វីនៅក្នុងកសិដ្ឋានរបស់អ្នក?**

(បំពេញឱ្យបានត្រឹមត្រូវបំផុត)

- ម្ចាស់ (ស្របច្បាប់និង/ឬទទួលខុសត្រូវខាងសេដ្ឋកិច្ចចំពោះកសិដ្ឋាន)
- សហកម្មសិទ្ធិ (ផ្នែកច្បាប់និង/ឬសហសេដ្ឋកិច្ចទទួលខុសត្រូវចំពោះកសិដ្ឋាន)
- អ្នកគ្រប់គ្រង (ទទួលខុសត្រូវចំពោះការសម្រេចចិត្តប្រចាំថ្ងៃលើប្រតិបត្តិការកសិកម្ម)
- សមាជិកគ្រួសារធ្វើការលើកសិដ្ឋាន
- បុគ្គលិក
- សមាជិកគ្រួសារមិនធ្វើការលើកសិដ្ឋាន
- ផ្សេងទៀត (បញ្ជាក់)

**I.1.4.OTH ផ្សេងទៀត (បញ្ជាក់)**

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**តើអ្នកអាចឆ្លើយសំណួរសម្រាប់ការកាន់កាប់កសិកម្មបានទេ?**

- បាទ/ចាស
- ទេ

**I.2 តើភាពជាម្ចាស់កម្មសិទ្ធិស្របច្បាប់នៃកសិដ្ឋានមានលក្ខណៈដូចម្តេច?**

(បំពេញក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- គ្រប់គ្រងមួយគ្រួសារ
- គ្រប់គ្រងលើសពីមួយគ្រួសារ
- គ្រប់គ្រងច្រើនគ្រួសាររួមគ្នា

**I.3 តើកសិដ្ឋាននេះមានលក្ខណៈជាអ្វី?**

- លក្ខណៈគ្រួសារ
- មិនមែនជាលក្ខណៈគ្រួសារ

**» I.4 អាសយដ្ឋានកសិដ្ឋាន**

**I.4.1 រាជធានី/ខេត្ត**

- បាត់ដំបង

**I.4.2 ក្រុង/ស្រុក/ខ័ណ្ឌ**



I.4.3 ឃុំ/សង្កាត់

I.4.4 ភូមិ

» I.5 លេខទូរស័ព្ទទំនាក់ទំនង

I.5.1 លេខទូរស័ព្ទដៃ

I.5.2 លេខទូរស័ព្ទលើកុ  
លេខទូរស័ព្ទដៃ

I.6 ទីតាំងកសិដ្ឋាន GPS

latitude (x.y °)

longitude (x.y °)

altitude (m)

accuracy (m)



I.7 តើអ្នកបានប្រើប្រាស់សេវាកម្ម កម្មវិធីទូរស័ព្ទ ណាមួយទាក់ទងនឹងការកាន់កាប់កសិកម្មរបស់អ្នកហើយឬនៅ?  
(បំពេញក្នុងរង្វង់កែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ

**I.8 តើកម្មវិធីទូរស័ព្ទអ្វីដែលអ្នកបានប្រើសម្រាប់សកម្មភាពកាន់កាប់របស់អ្នក?**

(អាសដើមទាំងអស់ហើយបំពេញនូវអ្វីដែលមាន)

- CamAgriMarket (MAFF)
- Tonlesap App (AMK)
- Agrilibrary (MAFF)
- ARDB Mobile (ARDB)
- GDAHP MAFF (MAFF)
- Guide to Raising Pigs
- MAFF News (MAFF)
- ផ្សេងទៀត (បញ្ជាក់)

**I.8.OTH ផ្សេងទៀត (បញ្ជាក់)**

**ផ្នែកទី ២: ចរិតលក្ខណៈនៃកសិដ្ឋាន**

**II.1 រាយការណ៍អំពីប្រភេទនៃការកាន់កាប់ដីកសិដ្ឋានរបស់កសិដ្ឋាន**

ឆ្នាំរយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (អាសដើមទាំងអស់ហើយបំពេញនូវអ្វីដែលមាន)

- កសិដ្ឋានផ្ទាល់ខ្លួន
- ជួលពីគ្រួសារដទៃ
- ផ្សេងទៀត (កាន់កាប់ខ្លីដោយមិនគិតថ្លៃរួមទាំងដីរួមដែលគ្រប់គ្រងដោយក្រុមហ៊ុន)
- កសិដ្ឋាននិងជួលឱ្យគេ (មិនដំណើរការ)

**II.1.a ផ្ទៃដីកសិដ្ឋាន**

**II.1.b ឯកតាខ្នាត**

- ហិចតា
- អារ
- ម៉ែត្រការ៉េ

**II.1.c សរុបផ្ទៃដីកសិដ្ឋាន**

**II.2 រាយការណ៍អំពីប្រភេទនៃការកាន់កាប់ដីកសិកម្មរបស់កសិដ្ឋាន**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (អាសយដ្ឋានទាំងអស់ហើយបំពេញនូវអ្វីដែលមាន)

- ដីដាំដំណាំរួមផ្សំ (ដំណាំរួមរយៈពេលខ្លី) នៅក្រោមផ្ទះកញ្ចក់
- ដីដាំដំណាំរួមផ្សំ (ដំណាំរួមរយៈពេលខ្លី)
- ដីដាំដំណាំទុកទំនេរចោល
- ដីស្មៅដុះ និងដីស្មៅដុះទុកឱ្យសត្វស៊ី
- ដីស្មៅច្បារ និងទីធ្លាខាងក្រោយផ្ទះ
- ដីដាំដំណាំអចិន្ត្រៃយ៍ (ដំណាំរយៈពេលវែង) នៅក្រោមផ្ទះកញ្ចក់
- ដីដាំដំណាំអចិន្ត្រៃយ៍ (ដំណាំរយៈពេលវែង)
- ដីវាលស្មៅ និងវាលស្មៅទុកឱ្យសត្វស៊ីអចិន្ត្រៃយ៍
- អគារកសិដ្ឋាននិងរោង
- ព្រៃនិងដីព្រៃផ្សេងទៀត
- ផ្ទៃដីវារីប្បកម្មនៅក្នុងកសិដ្ឋាន (មិនរាប់បញ្ចូលកន្លែងផ្សេងទៀត)
- ផ្ទៃដីផ្សេងទៀតដែលមិនបានចាត់ថ្នាក់នៅកន្លែងផ្សេង (មិនបានប្រើប្រាស់ ដីឆ្នុំ ដីសើម រួមទាំងផ្ទៃដីបន្លែធម្មជាតិ)

**II.2.a ផែនកសិដ្ឋាន**

**II.2.b ឯកតាខ្នាត**

- ហិចតា
- អាវ
- ម៉ែត្រការ៉េ

**II.2.c សរុបផ្ទៃដីកសិដ្ឋាន**

**II.3 តើកសិដ្ឋាននេះប្រើប្រាស់ឱ្យមត្តាដែលមិនត្រូវបានគ្រប់គ្រងដោយកសិដ្ឋាន (ឧ. ដីស្មៅដុះរួមជាមួយអ្នកដទៃ)**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២)

- បាទ/ចាស
- ទេ

**II.4 តើអ្នកបញ្ជាក់ថាផ្ទៃដីដែលបានគណនា (II.1 = II.2) ត្រូវនឹងផ្ទៃដីសរុបនៃកសិដ្ឋានដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (បំពេញក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ

**ផ្នែក A: ទំហំសេដ្ឋកិច្ចនៃកសិដ្ឋាន**

**A.1 តាមទស្សនៈសេដ្ឋកិច្ច តើកសិដ្ឋាននេះធ្វើកសិកម្មផ្ដោតសំខាន់លើអ្វីជាមធ្យម?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (បំពេញក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- ផលិតកម្មដំណាំជាចម្បង (ច្រើនជាង ២/៣ នៃផលិតកម្មសរុប)
- ផលិតកម្មសត្វជាចម្បង (ច្រើនជាង ១/៣ នៃផលិតកម្មសរុប)
- រួមបញ្ចូលគ្នាទាំងដំណាំ បសុសត្វ និងសកម្មភាពផលិតកម្មផ្សេងៗ (ខណៈពេលដែល ២/៣ ស្មើឬតិចជាងសរុបនៃផលិតកម្ម)

**» ផលិតកម្មដំណាំជាចម្បង**

1

**A.2 តើតម្លៃសរុបនៃផលិតកម្មដំណាំ ដែលផលិតដោយកសិដ្ឋានអ្វីខ្លះ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (បំពេញទាំងអស់នូវអ្វីដែលមាន) ដាក់  
ឈ្មោះដំណាំសំខាន់ៗទាំង ៥ ដែលផលិតដោយកសិដ្ឋាន និងបរិមាណផលសរុបនៃដំណាំនីមួយៗ (អតិបរមា ៥មុខ)

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**\* A.2.a ឈ្មោះដំណាំ**

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**\* A.2.b ទំហំផ្ទៃដី**

\_\_\_\_\_

**A.2.c ឯកតាខ្នាត**

- ហិចតា
- អាវ
- ម៉ែត្រការ៉េ

**\* A.2.d បរិមាណផល**

\_\_\_\_\_

**A.2.e ឯកតាខ្នាត**

- តោន
- គីឡូក្រាម
- ក្រាម

**\* A.2.f តម្លៃមធ្យមចុងក្រោយ**

\_\_\_\_\_

**A.2.g សរុបតម្លៃ**

- រៀលក្នុងមួយឯកតា
- ដុល្លារក្នុងមួយឯកតា

A.2.h សរុបតម្លៃ

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A.2.i ឈ្មោះដំណាំដែលទទួលផល

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A.2.j បរិមាណផល

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A.2.k ឯកតាខ្នាត

- គោន
- គីឡូក្រាម
- ក្រាម

A.2.l តម្លៃក្នុង១ឯកតា

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A.2.g សរុបតម្លៃ

- រៀលក្នុងមួយឯកតា
  - ដុល្លារក្នុងមួយឯកតា
- 

» ផលិតកម្មសត្វជាចម្បង

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\* A.3 ប្រភេទបសុសត្វ និងចំនួនបសុសត្វដែលបានចិញ្ចឹមក្នុងកសិដ្ឋាន?

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (បំពេញទាំងអស់នូវអ្វីដែលមាន) ប្រភេទបសុសត្វនិងបរិមាណបសុសត្វសំខាន់ៗចំនួន ៥ ដែលផលិតដោយកសិដ្ឋាននិងតម្លៃសរុប (អតិបរមា ៥ប្រភេទ)

- គោ
- ក្របី
- សេះ
- ជ្រូក
- ពពែ

A.3.a សត្វប៉ុន្មានក្បាល ចាប់ពីដើមឆ្នាំ (ស្តុក + សត្វកើត)

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**A.3.b សត្វប៉ុន្មានក្បាល ដែលបានទិញ ឬទទួលក្នុងឆ្នាំយោង**

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**A.3.c សត្វប៉ុន្មានក្បាល ដែលបានឱ្យគេ ស្លាប់ ឬ សម្លាប់ហូបក្នុងឆ្នាំយោង**

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**A.3.d សត្វប៉ុន្មានក្បាល ដែលបានលក់ បង់ជាកម្លាំងពលកម្ម ជួលឱ្យគេ ឬផ្លាស់ប្តូរក្នុងឆ្នាំយោង**

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**A.3.e តម្លៃជាមធ្យមឬចុងក្រោយក្នុងមួយឯកតា**

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**A.3.f តម្លៃក្នុងមួយឯកតា**

- រៀលក្នុងមួយឯកតា
- ដុល្លារក្នុងមួយឯកតា

A.3.g សរុបតម្លៃ

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**A.3.h ផលិតផលសត្វចិញ្ចឹម**

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**A.3.i បរិមាណផលិត**

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**A.3.j ឯកតាខ្នាត**

- តោន
- គីឡូក្រាម
- ក្រាម

**តម្លៃជាមធ្យមឬចុងក្រោយក្នុងមួយឯកតា**

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**A.3.l តម្លៃក្នុងមួយឯកតា**

- រៀលក្នុងមួយឯកតា
- ដុល្លារក្នុងមួយឯកតា

» ប្រភេទពូជសត្វ

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A.4.a ឈ្មោះពូជ

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A.4.b ឈ្មោះ: Breeds/ Crossbreed

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A.4.c ចំនួននៃសត្វ

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A.5 តើកសិដ្ឋាននេះមានសកម្មភាពផ្សេងៗនៅក្នុងកសិដ្ឋាន ក្រៅពីដំណាំនិងផលិតកម្មសត្វដែរឬទេ? (ឧទាហរណ៍: វារីវ្យាប័ណ្ណ កសិឧស្សាហកម្ម ជាដើម)

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវស្រង់តែមួយប៉ុណ្ណោះ)

បាទ/ចាស

ទេ

» សកម្មភាពផ្សេងៗក្នុងកសិដ្ឋាន

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A.6 តើផលិតកម្មពីសកម្មភាពផ្សេងៗក្នុងកសិដ្ឋានមានអ្វីខ្លះ?

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (បំពេញទាំងអស់នូវអ្វីដែលមាន) ឈ្មោះផលិតកម្ម ៗ ចំនួន ៥ នៅលើកសិដ្ឋាន (ក្រៅពីដំណាំនិងបសុសត្វ) និងបរិមាណផលសរុបរបស់វា (ឧទាហរណ៍: វារីវ្យាប័ណ្ណ កសិកម្ម ល។)

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A.6.a ឈ្មោះផលិតផលកសិកម្មផ្សេងទៀត

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A.6.b បរិមាណផលិត

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**A.6.c ឯកតាខ្នាត**

- គោន
- គីឡូក្រាម
- ក្រាម
- លីត្រ
- ផ្សេងទៀត

**A.6.d តម្លៃជាមធ្យមឬចុងក្រោយក្នុងមួយឯកតា**

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**A.6.e តម្លៃក្នុងមួយឯកតា**

- រៀលក្នុងមួយឯកតា
- ដុល្លារក្នុងមួយឯកតា

**A.6.f តម្លៃសរុបនៃបរិមាណ**

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**A.7 តើកសិដ្ឋាននេះ ទទួលបានផលចំណេញយ៉ាងដូចម្តេចដែរ? (ផលចំណេញមានន័យថា តម្លៃនៃបរិមាណសរុបធំជាងថ្លៃដើមផលិត)**

ឆ្នាំយោង: ក្នុងរយៈពេល ៣ឆ្នាំកន្លងមកនេះ  
(គូសក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- មិនមានផលចំណេញអ្វីទាំងអស់សម្រាប់រយៈពេលបីឆ្នាំនេះ
- ចំណេញរយៈពេលម្តងគត់ក្នុងរយៈពេលបីឆ្នាំនេះ
- ចំណេញរយៈពេលពីរគត់ក្នុងរយៈពេលបីឆ្នាំនេះ
- ចំណេញរាល់ពេលក្នុងរយៈពេលបីឆ្នាំនេះ

**A.8 តើកសិដ្ឋាននេះមានប្រើឬទទួលបាននូវយន្តការណាមួយដូចខាងក្រោម ដើម្បីការពារនិងគ្រោះហានិភ័យពីខាងក្រៅដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (អានជម្រើសទាំងអស់ហើយបំពេញនូវអ្វីដែលមាន)

- កសិដ្ឋាននេះមានសិទ្ធិទទួលបានឥណទាន (ឧទាហរណ៍ ផ្លូវការនិង/ឬក្រៅផ្លូវការ) សម្រាប់ការប្រឆាំងនឹងផលប៉ះពាល់
- ការកាន់កាប់នេះមានសិទ្ធិទទួលបានការធានារ៉ាប់រងសម្រាប់ការប្រឆាំងនឹងផលប៉ះពាល់
- ការកាន់កាប់នេះមិនអាចចូលប្រើឬមិនទទួលបាននូវយន្តការណាមួយខាងលើ ដើម្បីការពារប្រឆាំងនឹងផលប៉ះពាល់

**ផ្នែក B: វិមាត្របរិស្ថាននៃកសិដ្ឋាន**

**B.1 តើមានការគំរាមកំហែងដល់ការបំផ្លាញដីណាមួយខាងក្រោមនេះបានកើតឡើងលើកសិដ្ឋានរបស់អ្នកទេ?**

ឆ្នាំយោង: ៣ឆ្នាំចុងក្រោយ (អានជម្រើសទាំងអស់ហើយបំពេញអ្វីដែលមាន)

- សំណឹកដី (ការបាត់បង់ដីលើដោយសារខ្យល់ឬសំណឹកទឹក)
- ការថយចុះដីជាតិដី
- បណ្តាលមកពីមានទឹកជំនន់
- ការស្រោចទឹកដីស្រោចស្រព
- ផ្សេងៗទៀត (បញ្ជាក់បន្ថែម)
- គ្មានចំណុចណាមួយខាងលើ

**B.1.OTH ផ្សេងទៀត (បញ្ជាក់)**

**B.2 តើផ្ទៃដីសរុបនៃកសិដ្ឋានត្រូវបានគំរាមកំហែងដោយគ្រោះថ្នាក់ណាមួយដែលបានរាយខាងលើ?**

ឆ្នាំយោង: ៣ឆ្នាំចុងក្រោយ

- សរុបផ្ទៃដីដែលរងផលប៉ះពាល់
- ទេ

**B.2.a ផ្ទៃដី**

**B.2.b ឯកតាខ្នាត**

- ហិចតា
- អា
- ម៉ែត្រការ៉េ

**B.3 តើកសិដ្ឋាននេះប្រើទឹក ដើម្បីស្រោចស្រពដំណាំដែរឬទេ?**

ឆ្នាំយោង: ៣ឆ្នាំចុងក្រោយ (គូសក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ / ចាស (បង្ហាញពីផ្ទៃដីឬភាគរយនៃផ្ទៃដីសរុបនៃកសិដ្ឋានដែលត្រូវបានស្រោចស្រព)
- ទេ ខ្ញុំមិនត្រូវការប្រព័ន្ធធារាសាស្ត្រទេ
- ទេ ខ្ញុំមិនអាចមានលទ្ធភាពស្រោចស្រពបានទេ
- ទេ ដោយសារគ្មានទឹក

**B.3.a ឯកតាខ្នាត**

- ហិចតា
- អា
- ម៉ែត្រការ៉េ

**B.4 តើមានការថយចុះបរិមាណទឹកដែលទទួលបានពីអណ្តូងទឹកឬប្រភពផ្សេងទៀតដូចជាបឹងប្រឡាយ ឬទន្លេដែរឬទេ?**

- ទេ ពេលខ្ញុំត្រូវការទឹកវាតែងតែមានបរិមាណគ្រប់គ្រាន់
- បាទ/ចាស កម្រិតទឹកនៅក្នុងអណ្តូងខ្ញុំកំពុងធ្លាក់ចុះជាលំដាប់
- បាទ / ចាស ទឹកនៅតាមដងទន្លេបឹងនិងប្រឡាយកំពុងខ្វះខាតហើយខ្ញុំនឹងមិនអាចពឹងផ្អែកលើការផ្គត់ផ្គង់បានទៀងទាត់ទេ នៅពេលខ្ញុំត្រូវការវា
  
- ខ្ញុំមិនដឹងទេ

**B.5 តើមានអង្គការបែងចែកទឹកនៅក្នុងតំបន់កសិដ្ឋាននេះដែរឬទេ?**

ឆ្នាំយោង: ៣ឆ្នាំចុងក្រោយ (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ / ចាស ពួកគេធ្វើការបានល្អ
- បាទ / ចាស ប៉ុន្តែពួកគេធ្វើការមិនបានល្អ (សូមបញ្ជាក់មូលហេតុ)
- ទេ គ្មានទេ
- ខ្ញុំមិនដឹងទេ

**B.5.OTH បញ្ជាក់មូលហេតុ**

**B.6 តើមានជីសំយោគឬវិប្បលាមកសត្វ/កាកសំណល់សត្វដែលប្រើលើដំណាំកសិដ្ឋាននេះទេ?**

ឆ្នាំយោង: ៣ឆ្នាំចុងក្រោយ (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ / ចាស
- ទេ

**B.7 តើអ្នកដឹងអំពីហានិភ័យបរិស្ថានដែលទាក់ទងនឹងការប្រើប្រាស់លើសលប់ ឬការប្រើប្រាស់ជីខុសដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ / ចាស
- មិនបានដឹងទេ

**B.8 តើកសិដ្ឋានរបស់អ្នក មានវិធានការជាក់លាក់ដើម្បីកាត់បន្ថយហានិភ័យបរិស្ថានដែលទាក់ទងនឹងការប្រើប្រាស់ជីសំយោគ និងវីដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ / ចាស
- មិនមានទេ



**B.9 បើដូច្នោះ តើវិធានការជាក់លាក់មួយណាដែលកសិដ្ឋានរបស់អ្នកបានអនុវត្ត ឬអនុម័តប្រើប្រាស់?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (អាសន្នប្រើសទាំងអស់ហើយបំពេញនូវអ្វីដែលមាន)

- អនុវត្តតាមសេវាកម្មកសិកម្ម ឬការណែនាំពីហាងលក់រាយ ឬបទប្បញ្ញត្តិក្នុងស្រុក មិនត្រូវលើសពីកម្រិតដែលបានណែនាំទេ
- ប្រើប្រកាសវិវាទនៃសារធាតុចិញ្ចឹម (រួមទាំងសំណល់លាមកសត្វ ឬជីកំប៉ុស) តែម្នាក់ឯង ឬរួមផ្សំជាមួយជីសំយោគ ឬសារធាតុដី
- ប្រើគ្រាប់ធញ្ញជាតិជាដំណាក់កម្រប ឬជាធាតុផ្សំនៃប្រព័ន្ធពហុ/ដំណាំ ឬវាលស្មៅ ដើម្បីកាត់បន្ថយការប្រើប្រាស់ជី
- ចែកចាយកម្មវិធីជីសំយោគ ឬជីប៊ែរ ក្នុងរយៈពេលលូតលាស់
- ពិចារណាអំពីប្រភេទដី និងអាកាសធាតុក្នុងការសម្រេចចិត្តកម្រិតនៃការប្រើប្រាស់ជី
- ប្រើគំរូដីយ៉ាងហោចណាស់រៀងរាល់ 5 ឆ្នាំម្តង ដើម្បីអនុវត្តការគណនាថវិកាសារធាតុចិញ្ចឹម
- អនុវត្តការគ្រប់គ្រងសារធាតុចិញ្ចឹមជាក់លាក់តាមតំបន់ ឬការធ្វើកសិកម្មច្បាស់លាស់
- ប្រើបន្ទះសតិបណ្តោះអាសន្ននៅតាមបណ្តោយផ្លូវទឹក

**B.10 តើកសិដ្ឋាននេះបានប្រើថ្នាំសម្លាប់សត្វល្អិតសម្រាប់ដំណាំ ឬចិញ្ចឹមសត្វដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវស្រាវជ្រាវតែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ

**B.11 តើថ្នាំកសិកម្មប្រភេទប្រភេទណាខ្លះដែលកសិដ្ឋាននេះបានប្រើប្រាស់?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវស្រាវជ្រាវតែមួយប៉ុណ្ណោះ)

- កម្រិតមធ្យម ឬគ្រោះថ្នាក់តិចតួច
- កម្រិតខ្ពស់ គ្រោះថ្នាក់ខ្លាំង ឬថ្នាំសម្លាប់សត្វល្អិតខុសច្បាប់

**B.12 តើអ្នកដឹងពីហានិភ័យបរិស្ថាន និងសុខភាពដែលទាក់ទងនឹងការប្រើប្រាស់ថ្នាំសម្លាប់សត្វល្អិតដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវស្រាវជ្រាវតែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- មិនដឹងទេ

**B.13 តើកសិដ្ឋាននេះ មានវិធានការជាក់លាក់ណាមួយ ដើម្បីការពារប្រជាជនពីហានិភ័យទាក់ទងនឹងសុខភាពដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវស្រាវជ្រាវតែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- មិនមានទេ

**B.14 តើវិធានការខាងក្រោមមួយណា ដែលកសិដ្ឋាននេះបានអនុម័ត ដើម្បីការពារប្រជាជនពីហានិភ័យទាក់ទងនឹងសុខភាព?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (អាសន្នប្រើសទាំងអស់ ហើយបំពេញនូវអ្វីដែលមាន)

- ការប្រកាន់ខ្ជាប់នូវការណែនាំសម្រាប់ការប្រើប្រាស់ថ្នាំកសិកម្ម (រួមទាំងការប្រើប្រាស់ឧបករណ៍ការពារ)
- ការថែទាំ និងសម្អាតឧបករណ៍ការពារក្រោយពេលប្រើប្រាស់
- ការចោលកាកសំណល់ដោយសុវត្ថិភាព (ប្រអប់ ដប និងថង់)

**B.15 តើកសិដ្ឋាននេះបានអនុវត្តនូវវិធានការជាក់លាក់ ដើម្បីបញ្ឈប់សហនិក័យទាក់ទងនឹងបរិស្ថានដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ

**B.16 តើវិធានការមួយណាខាងក្រោមដែលកសិដ្ឋាននេះបានអនុវត្តទាក់ទងនឹងការគ្រប់គ្រងសត្វល្អិត? (ជ្រើសត្វល្អិត និងសត្វចម្លងជំងឺ)**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (អានជម្រើសទាំងអស់ ហើយបំពេញនូវអ្វីដែលមាន)

- ការប្រកាន់ខ្ជាប់នូវការណែនាំសម្រាប់ការប្រើប្រាស់ថ្នាំសម្លាប់សត្វល្អិត
- ការកែតម្រូវពេលវេលាដាំ
- ការអនុវត្តកម្លាតដំណាំ
- អនុវត្តការដាំដំណាំវិលជុំ
- ការអនុវត្តដំណាំចម្រុះ
- ការអនុវត្តដំណាំចន្លោះ
- អនុវត្តការគ្រប់គ្រងសត្វល្អិតជីវសាស្ត្រ
- ការប្រើប្រាស់ថ្នាំសំលាប់មេរោគ
- អនុវត្តវិលជុំវាលស្មៅ ដើម្បីទប់ស្កាត់ចំនួនសត្វចង្រៃ
- ការដកយកចេញជាប្រព័ន្ធនៃផ្នែករុក្ខជាតិដែលត្រូវបានវាយប្រហារដោយសត្វល្អិត
- ថែទាំ និងសម្អាតឧបករណ៍បាញ់ថ្នាំបន្ទាប់ពីប្រើរួច
- ប្រើថ្នាំសម្លាប់សត្វល្អិតមួយមុខមិនឱ្យលើសពីពីរដង ឬលាយក្នុងមួយដូរដើម្បីជៀសវាងភាពធន់នឹងថ្នាំសម្លាប់សត្វល្អិត។

**B.17 នៅក្នុងកសិដ្ឋាននេះ តើមានតំបន់គ្របដណ្តប់ដោយរុក្ខជាតិធម្មជាតិ ឬចម្រុះ? រួមបញ្ចូលតែមួយ ឬរួមបញ្ចូលគ្នា ដូចខាងក្រោម:**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (អានជម្រើសទាំងអស់ ហើយបំពេញនូវអ្វីដែលមាន)

- វាលស្មៅធម្មជាតិឬដីស្មៅធម្មជាតិ
- ផ្កាព្រៃWildflower strips
- គំនរថ្ម ឬឈើ
- ដើមឈើឬរបងការពារ
- ស្រះធាតុនខាងលើម្តុំជាតិ ឬដីសើម
- មិនមានដូចខាងលើ

**B.18 តើផ្ទៃដីសរុបនៃការកាន់កាប់គ្របដណ្តប់ដោយរុក្ខជាតិធម្មជាតិ ឬចម្រុះណាមួយដែលបានកំណត់ខាងលើមានប៉ុន្មាន?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២)

- ផ្ទៃដីសរុបគ្របដណ្តប់
- ទេ

**B.18.a ផ្ទៃដី**

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**B.18.b ឯកតាខ្នាត**

- ហិចតា
- អារ
- ម៉ែត្រការ៉េ

**B.19 តើអ្នកកំពុងប្រើថ្នាំប្រឆាំងអតិសុខុមប្រាណដែលមានសារៈសំខាន់ផ្នែកវេជ្ជសាស្ត្រជាអ្នកលើកកម្ពស់ការចិញ្ចឹមសត្វរបស់អ្នកឬ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ

**B.20 ភាគរយនៃផ្ទៃដីកសិកម្មដែលការបង្វិលដំណាំ ឬការបង្វិលដំណាំ/វាលស្មៅដែលពាក់ព័ន្ធយ៉ាងហោចណាស់ដំណាំ/វាលស្មៅនៃប្រភេទរុក្ខជាតិ ពីរផ្សេងគ្នាត្រូវបានអនុវត្ត?**

ឆ្នាំយោង: ក្នុងរយៈពេល ៣ឆ្នាំកន្លងមកនេះ(ទុកចោល ប្រសិនបើមិនបានអនុវត្ត)

- ភាគរយនៃផ្ទៃដីកសិកម្ម
- ទេ

**B.20.a ភាគរយនៃផ្ទៃដី**

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**B.21 តើកសិដ្ឋានបានផលិតដំណាំ និង/ឬ សត្វពាហនៈដែលត្រូវបានបញ្ជាក់សរីរាង្គ ឬកំពុងដំណើរការវិញ្ញាបនប័ត្រសរីរាង្គក្នុងអំឡុងពេលយោង នៃរបៀប?**

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- បាទ/ចាស
- ទេ

**B.22 ឆ្លើយសំណួរខាងក្រោមអំពីវិញ្ញាបនប័ត្រសរីរាង្គរបស់កសិដ្ឋាន**

ឆ្នាំយោង: រយៈពេល12 ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- រាយការណ៍ពីលេខចុះបញ្ជីសរីរាង្គរបស់អ្នកកាន់
- រាយការណ៍ពីឈ្មោះស្ថាប័នបញ្ជាក់

**B.22.a រាយការណ៍ពីលេខចុះបញ្ជីសរីរាង្គរបស់អ្នកកាន់កាប់**

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**B.22.b រាយការណ៍ពីឈ្មោះស្ថាប័នបញ្ជាក់**

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**ផ្នែក C: វិមាត្រសង្កមនៃកសិដ្ឋាន**

**C.1 តើកសិដ្ឋាននេះ បានជួលកម្មករណាម្នាក់សម្រាប់បំពេញការងារធម្មតា និងជារដូវកាលដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ

**C.2 តើកសិដ្ឋាននេះ បានចំណាយជាមធ្យមប៉ុន្មានជាសាច់ប្រាក់ និង/ឬជួលក្នុងអំណោយផលដល់កម្មករដែលបំពេញការងារធម្មតា និងជារដូវកាលក្នុងមួយថ្ងៃ (នៃ ៨ ម៉ោង)?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (អានជម្រើសទាំងអស់ ហើយបំពេញនូវអ្វីដែលមាន)

- ប្រាក់ឈ្នួលជាមធ្យមប្រចាំថ្ងៃជាឯកតាគិតជាលុយរៀល
- ប្រាក់ឈ្នួលជាមធ្យមប្រចាំថ្ងៃដែលបានបង់តាមប្រភេទ និងបំប្លែងជាឯកតាលុយរៀល

**C.2.a ប្រាក់ឈ្នួលជាមធ្យមប្រចាំថ្ងៃ**

**C.3 ក្នុងអំឡុងពេល 12 ខែចុងក្រោយនេះ តើមានពេលដែលអ្នក (ឬសមាជិកណាម្នាក់នៅក្នុងគ្រួសារ) មានការព្រួយបារម្ភថាអ្នកនឹងមិនមានអាហារគ្រប់គ្រាន់សម្រាប់បរិភោគដោយសារតែខ្វះខាត ឬធនធានផ្សេងទៀតដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**C.4 នៅតែគិតអំពីរយៈពេល 12 ខែចុងក្រោយនេះ តើមានពេលណាដែលអ្នក (ឬសមាជិកណាម្នាក់នៅក្នុងគ្រួសារ) មិនអាចញ្ជាំអាហារដែលមានសុខភាពល្អ និងជីវជាតិ ដោយសារខ្វះខាត ឬធនធានផ្សេងទៀតដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**C.5 តើមានពេលមួយណាដែលអ្នក (ឬសមាជិកណាម្នាក់ក្នុងគ្រួសារ) ញាំអាហារបន្តិចបន្តួច ដោយសារតែខ្វះខាត ឬធនធានផ្សេងទៀតដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**C.6 តើមានពេលមួយណាដែលអ្នក (ឬសមាជិកណាម្នាក់ក្នុងគ្រួសារ) ត្រូវលងអារាម ដោយសារមិនមានប្រាក់គ្រប់គ្រាន់ ឬធនធានផ្សេងទៀត ដើម្បីទទួលបានអាហារដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**C.7 នៅតែគិតអំពីរយៈពេល ១២ ខែចុងក្រោយនេះ តើមានពេលមួយណាដែលអ្នក (ឬសមាជិកណាម្នាក់នៅក្នុងគ្រួសារ) ញ៉ាំតិចជាងអ្វីដែលអ្នកគិត ដោយសារតែការខ្វះខាតលុយ ឬធនធានផ្សេងទៀតដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**C.8 តើមានពេលមួយណា ដែលគ្រួសាររបស់អ្នកអស់អាហារ ដោយសារតែខ្វះលុយ ឬធនធានផ្សេងទៀតដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**C.9 តើមានពេលមួយណាដែលអ្នក (ឬសមាជិកណាម្នាក់ក្នុងគ្រួសារ) ឃ្លានប៉ុន្តែមិនបានញ៉ាំទេ ពីព្រោះមិនមានប្រាក់គ្រប់គ្រាន់ ឬធនធានផ្សេង ទៀតសម្រាប់អាហារ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**C.10 ក្នុងអំឡុងពេល ១២ ខែចុងក្រោយនេះ តើមានពេលមួយណាដែលអ្នក (ឬសមាជិកណាម្នាក់នៅក្នុងគ្រួសារ) បានចេញទៅក្រៅដោយមិនបាន ញ៉ាំអាហារពេញមួយថ្ងៃ ដោយសារតែខ្វះលុយ ឬធនធានផ្សេងទៀតដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២) (ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ



**C.11 តើម្ចាស់កសិដ្ឋាន/កសិដ្ឋានមានឯកសារផ្លូវការសម្រាប់ដឹកសិកម្មណាមួយដែលខ្លួនបានកាន់កាប់ (ជំនួសវិញ កម្មសិទ្ធិ ប្រើប្រាស់ កាន់កាប់) ចេញដោយភ្នាក់ងារចុះបញ្ជីដីធ្លី/សុរិយោដីដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២)(ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**C.12 តើឈ្មោះរបស់ម្ចាស់កសិដ្ឋាន ឬសមាជិកណាម្នាក់ក្នុងកសិដ្ឋានត្រូវបានចុះបញ្ជីជាម្ចាស់ ឬអ្នកមានសិទ្ធិលើឯកសារដែលទទួលស្គាល់ស្របច្បាប់ ដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២)(ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**C.13 តើម្ចាស់កសិដ្ឋានមានសិទ្ធិក្នុងការលក់ក្បាលដីណាមួយនៃកសិដ្ឋានដែរឬទេ (ជាជម្រើស 'ក្បាលដីមាន ប្រើ ឬកាន់កាប់')?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២)(ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**C.14 តើម្ចាស់កសិដ្ឋាន/អ្នកកាន់កាប់កសិដ្ឋាន មានសិទ្ធិរក្សាទុកជាភ្នាក់ងារលើក្បាលដីណាមួយនៃកសិដ្ឋានដែរឬទេ?**

ឆ្នាំយោង: រយៈពេល១២ ខែកន្លងមក (គិតចាប់ពីថ្ងៃទី០១ ខែកុម្ភៈ ឆ្នាំ២០២១ ដល់ថ្ងៃទី១០ ខែមករា ឆ្នាំ២០២២)(ត្រូវក្នុងរង្វង់តែមួយប៉ុណ្ណោះ)

- បាទ/ចាស
- ទេ
- ខ្ញុំមិនដឹងទេ
- ខ្ញុំមិនចង់ឆ្លើយទេ

**បញ្ចប់ការសម្ភាសន៍**

hh:mm



Food and Agriculture  
Organization of the  
United Nations



**SDG Indicator 2.4.1**

# **Enumerators Manual**

**(Farm Survey Module)**

**08/08/2021**

Note: This enumerator manual was prepared in support to the farm survey data collection on SDG indicator 2.4.1 and has been revised in light of the cognitive tests conducted in Mexico, Kenya and Bangladesh in year 2018-19.

## List of acronyms:

**AGRIS** Agricultural Integrated Survey

**EGM** Expert Group Meeting

**FAO** Food and Agriculture organization of the United Nations

**FIES** Food Insecurity Experience Scale

**GHS** Globally Harmonized System on Classification and Labelling of Chemicals

**GSARS** Global Strategy to improve Agricultural and Rural Statistics

**HHPs** Highly Hazardous Pesticides

**ILO** International Labor Organization

**NSO** National Statistical Office

**IPM** Integrated Pest Management

**IRT** Item Response Theory

**ISCO** International Standard Classification of Occupations

**ISIC** International Standard Industrial Classification of the United Nations

**SDGs** Sustainable Development Goals

**WCA** World Programme for the Census of Agriculture

**SEEA** System of Environmental-Economic Accounting -Central Framework

**UN** United Nations

**UNESCO** United Nations Educational, Scientific and Cultural Organisation

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## Introduction:

This Enumerator Manual is developed to help enumerators and supervisors to administer the survey module designed for SDG indicator 2.4.1. It provides a detailed description of the survey instrument and reviews Standard Operating Procedures for each question. The purpose of this manual is to ensure that there is a common understanding of questions and response codes by all enumerators and supervisors.

Briefly, it details the following issues:

- Rationale behind inclusion of a particular module in the survey
- Definition of terms and the meaning behind the questions asked
- Guidance on the use of SKIP questions and FILTER questions
- Examples of commonly encountered instances where questions and responses may not be easy to administer and record respectively

The SDG indicator 2.4.1 “proportion of agricultural area under productive and sustainable agriculture” is measured using a farm survey. In this respect FAO has developed SDG 2.4.1. farm survey questionnaire specifically designed to collect information on SDG 2.4.1. The questionnaire consists of bear minimum questions and be administered standalone or customised to be attached as a module or integrated at appropriate places within current surveys at appropriate places. The ultimate objective of the survey module is to collect information on 11 different themes and sub-indicator that constitute the framework of SDG 2.4.1 at the agricultural holding level (details are given in table 1).

**Table 1. List of themes and sub-indicators**

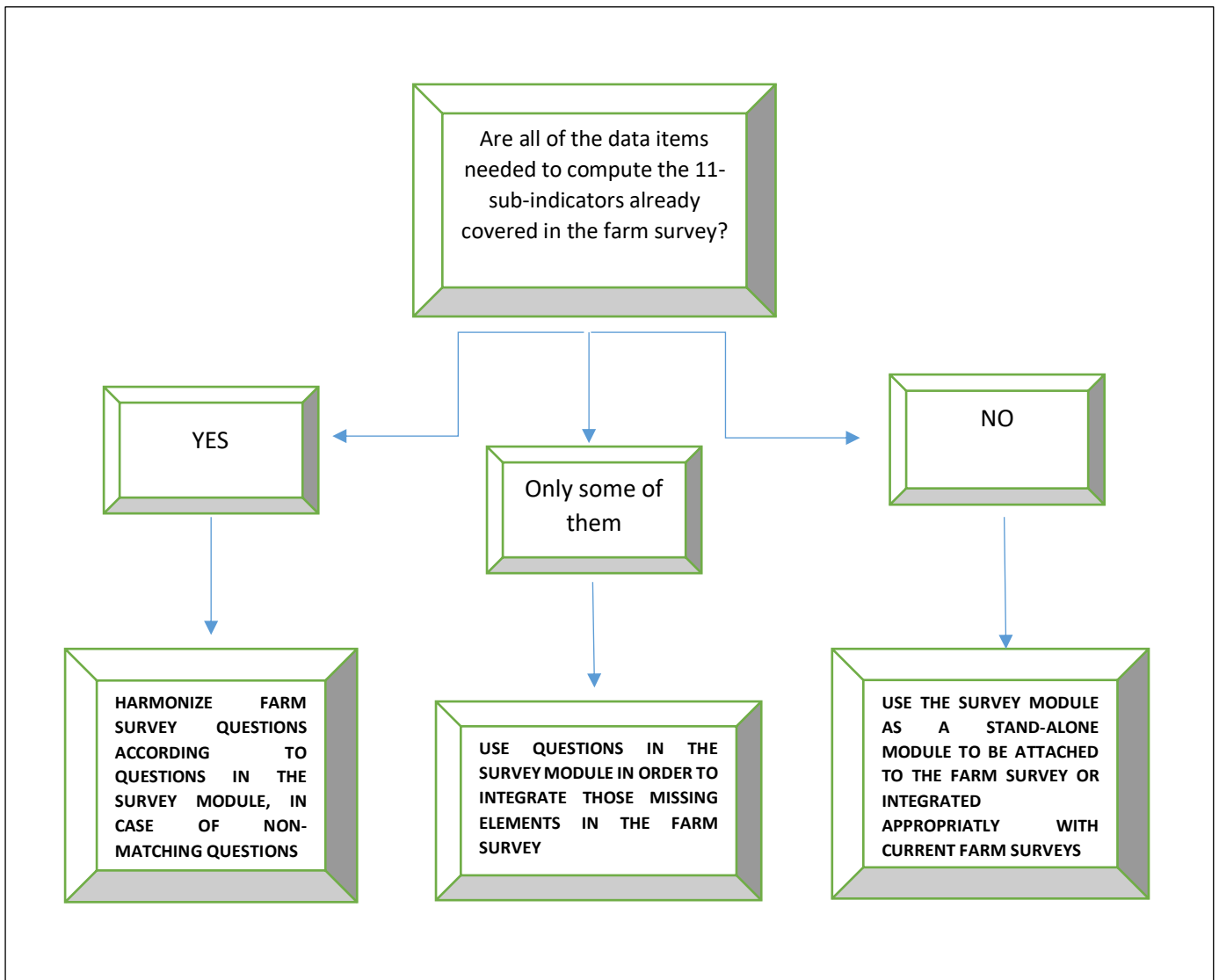
No.	Themes	Sub-indicators
1	Land productivity	Farm output value per hectare
2	Profitability	Net farm income
3	Resilience	Risk mitigation mechanisms
4	Soil health	Prevalence of soil degradation
5	Water use	Variation in water availability
6	Fertilizer pollution risk	Management of fertilizers
7	Pesticide risk	Management of pesticides
8	Biodiversity	Use of agro-biodiversity-supportive practices
9	Decent employment	Wage rate in agriculture
10	Food security	Food Insecurity Experience Scale (FIES)
11	Land tenure	Secure tenure rights to land

This document is structured as follows: Section I presents the way survey questionnaire is organized and structured, as well as the main concepts attached to the module itself. Section II details each of the questions in the survey module; it clarifies the meaning underlying each questions and the way enumerators should record the corresponding information, which question to ask next and which question is to be skipped.



As highlighted above, the survey questionnaire can be integrated into existing farm surveys, either by 1) attaching the module itself to the farm survey, as a standalone module; or 2) by extracting from the module those missing elements that are not included or covered by existing farm survey. The diagram below summarizes the way the survey module can be used.

The possible ways the survey module can be used:



The questionnaire is comprised of 5 sections (i.e. I, II, A, B and C) and one additional introductory section to record information on the enumerators details (to be prefilled by the enumerators). Each section within the module collect information on the 11-sub-indicators across the three dimensions as per table 2 below.

**Table 2. Structure of the questionnaire:**

Sections	
Survey Preparation	
Section I	Introduction to the survey module and identification of the holding and holder
Section II	Area of the holding
Section A	Economic dimension of the holding
Section B	Environmental dimension of the holding
Section C	Social dimension of the holding

Data collected using the module are primarily structured at the agricultural holding level (the unit of observation for this indicator). Nonetheless, some of the information, particularly on agricultural production, are collected at the product level and is associated with the holding, thus leading to a greater degree of specificity of the agricultural holding itself (see section II).

**Specifications:**

1. Confidentiality: It is necessary that before starting the interview the enumerators ensure respondents that the information collected will remain strictly confidential. It is worth noting that in order to protect the confidentiality of respondents and their answers any sensitive information (i.e. information on the identification of the respondents and on the location of the agricultural holdings) will be hidden and removed from publicly available datasets.
2. Questions must be asked exactly as worded; changing words or phrases, adding or dropping words to a question must be avoided. Also, unless in case of a skip pattern, a question must always be asked, even when the answer is obvious to the interviewer: writing an answer without asking the question must be avoided at any time.
3. Each section of the module contains a specific recall period according to which the information is collected. The recall period is clearly expressed in the upper-left side of each section, as per example below:

<b>A.5</b>	Did the holding carry out other on-farm activities than crops and livestock? (Read the list)	
	<b>Reference year:</b>	<b>Last calendar year</b>
	(Fill in one circle only)	
	<input type="radio"/>	1 Yes
	<input type="radio"/>	2 No
		<a href="#">→ Go to A.7</a>

4. Most of the questions refer to the last calendar year prior to the date of the interview. Some sections, however, make reference to the last three calendar years. The last calendar year is a period of 12 months from January 1 to December 31. For example, if data collection is done in May 2018, the last calendar year will be from January 1 2017 to December 31 2017. Similarly, the last 3 calendar years will be from January 1 2015 to December 31 2017. Important to note is that questions from C.3 to C.10, i.e. question capturing information on Food Security are asked, instead, with reference to the last 12 months prior to the date of the interview.



### I.1.2 Surname name

Record the surname name of the selected respondent.

### I.1.3.Sex

Record the sex of the selected respondent. Codes for sex are 1 for male and 2 for female.

### I.1.4 What is your role on the agricultural holding?

This question is aimed at identifying the function of the respondent within the agricultural holding.

I.1.4 What is your role on the agricultural holding?

(Fill in the most appropriate)

- |                       |   |  |                        |
|-----------------------|---|--|------------------------|
| <input type="radio"/> | 1 | Holder (legal and/or economically responsible for the holding)               | → Go to I.2            |
| <input type="radio"/> | 2 | Co-holder (legal and/or economically co-responsible for the holding)         | → Go to I.2            |
| <input type="radio"/> | 3 | Manager (responsible for the day-to-day decisions on the farming operations) | → Go to I.2            |
| <input type="radio"/> | 4 | Household member working on the holding                                      | → Go to I.1.5          |
| <input type="radio"/> | 5 | Employee   | → Go to I.1.5          |
| <input type="radio"/> | 6 | Household member not working on the holding                                  | → End of the interview |
| <input type="radio"/> | 7 | Other (specify <input type="text"/> )  | → End of the interview |

The codes for the respondents are:

1. Holder (legal and/or economically responsible for the holding);
2. Co-holder (legal and/or economically co-responsible for the holding);
3. Manager (responsible for the day-to-day decisions on the farming operations);
4. Household member working on the holding;
5. Employee;
6. Household member not working on the holding;
7. Other (specify).

In order to collect reliable information on the agricultural holding, enumerators are recommended to select the holder or co-holder of the agricultural holding as respondents of the survey (i.e. **Codes 1 and 2**), since they are likely to be the most well informed individuals about the agricultural activities of the holding.

**Important notes:** In case the selected respondent is:

1. Manager of the agricultural holding (i.e. **code 3**):

**Enumerators do not ask questions in section C from C.3 to C.10 (on Food security).** Enumerators proceed by recording information on all other questions in the survey.

2. Household member working on the holding (i.e. **code 4**):

Enumerators further ask whether (or not) the household member working on the holding is able to answer questions related to the agricultural holding as well as household of the holder. This check is operationalized in the survey by asking question **I.1.5** to the household member working on the holding: “are you able to answer questions for the agricultural holding”? **If not, enumerators select another respondent and re-start the interview.**

3. Employee working on the holding (i.e. **code 5**):

Enumerators further ask whether (or not) the employee working on the holding is able to answer questions related to the agricultural holding. This check is operationalized in the survey by asking by asking question **I.1.5** to the selected employee: “are you able to answer questions for the agricultural holding?” **If not, enumerators select another respondent and re-start the interview. In case of**

**positive answer, instead, the interview should continue, but enumerators should not ask questions in section C from C.3 to C.10 (on Food security).**

4. Household member not working on the holding (code 6) or another respondent (code 7), the **enumerators will re-start the interview** after having reached another person who is more informed about the activities and characteristics of the agricultural holding.

### **I.1.5 Are you able to answer questions for the agricultural holding?**

- 1 Yes  
 2 No

→ Go to I.2  
→ End of the interview

This Yes/No question is only asked to respondent whose function in the agricultural holding is “Household member working on the holding” (Code 4 in question I.1.4) or “Employee” (Code 5 in question I.1.4). This question ascertains whether (or not) the selected respondent is well-informed about economic, social and environmental aspects of the agricultural holding. In case the respondent says “No” (Code 2), enumerator must find another more informed respondent and re-start the interview, ideally holder, co-holder or manager of the holding.

### **I.2 What is the legal status of the holder?**

(Fill in one circle only)

- 1 Civil person/natural person  
 2 Group of civil persons/natural persons  
 3 Legal person

The question collects information on the legal status of the holder, and, depending on the legal status, three codes are associated to three different options:

1. Civil person / natural person
2. Group of civil person/natural person
3. Legal person

Box 1 provide the definition for the above-mentioned three legal statuses of the holder (Source: Handbook on the Agricultural Integrated Survey - AGRIS, GSARS, 2017)<sup>1</sup>

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<sup>1</sup> <http://www.fao.org/3/ca6412en/ca6412en.pdf>

### Box 1: Legal status of the holder

#### **Civil (natural) person:**

In this case, one woman or man is legally, socially and economically responsible for her or his independent activity of production, and can be clearly identified by her or his name, surname and date of birth. Most often, this person is also technically responsible, although in some cases, a manager may be in charge of the day-to-day decisions or more (what to sow, when to sell, etc.). However, agricultural holdings whose holder has this legal status may fall outside the household sector if they behave as corporations and sell the main part of their production

#### **Group of civil (natural) persons:**

In this case, several civil persons (as defined above) have decided to pool means of production, totally or partially, to benefit each one of them. It generally concerns two or three persons; exceptionally, six or seven persons may be involved. These persons are collectively responsible for the holding. In some cases, these holdings are not within the household sector because the association between several holders (not living in the same household) must be registered under national legislation. Finally:

#### **Legal person:**

In this case, some natural and/or legal persons share the capital stock of a private company. This may also be a public company or a similar entity, such as a corporation, a cooperative, a governmental institution or a church. This form of organization falls outside of the household sector. The status involves formal registration according to the applicable national legislation.

### I.3 What type of holding is this?

(Fill in one circle only)

- 1 Household
- 2 Non-household

This question collects information on the type of operating holding, which must be adapted to existing national legal status and therefore should be established according to country-specific characteristics. The type of holding can be household or non-household, depending on the country-specific criteria that define a holding type. Box 2 below provides details on the main concepts underlying the legal status of the holding (Source: Handbook on the Agricultural Integrated Survey - AGRIS, GSARS, 2017). This question is asked to distinguish between holdings in the **HOUSEHOLD SECTOR** and holding in the **NON-HOUSEHOLD** sectors. Two approaches can be adopted according to the criteria listed below:

1. **Holdings in the Household sector** are those where the holder is a civil (natural) person or group of civil (natural) persons.
2. **A combination of the legal status of the holder and the holding** is used to refine the limits between the household and non-household sector holdings.





## I.6 GPS coordinates of the holding

I.6.1 Longitude	.	.	.	.	.	.	.	.	.	.	.	.	.	.
I.6.2 Latitude	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Enumerators record the GPS coordinates of the agricultural holding using a smart phone or GPS device (if available). If devices for obtaining GPS coordinates are not provided to enumerators, this information must be obtained by enumerators before going to the field, by accurately recording the longitude and latitude related to the centre of gravity of the holding (location at the centre of the agricultural area of the holding). If the holding’s buildings are at the centre of the holding, the coordinates of the farm building can be used.

It is important to accurately record the longitude and latitude of the area of the holding, in order for the enumerators to reach out to the respondent again in the future in case of misreported values.

## Section II: AREA OF THE HOLDING

This section collects information on the area of holding. Total area of holding is derived by summing the areas under each of the land use categories and under each land tenure arrangement. Data on land tenure types are collected at a holding level.

**Introduction to question II.1-II.4.** Questions from II.1 to II.4 collect information on the total area of the holding by land use type and land tenure type, including information on common land that are exclusively managed by the holding. It is important to notice that common land is included in the scope insofar as it is occupied exclusively (i.e. managed and used) by the agricultural holding.

### II.1 Report land tenure type of the agricultural area of the holding

Reference year: Last calendar year  
(Read all options and fill in all that apply)

		Area of the holding	Unit of measure
<input type="radio"/> 1	Owned and operated	. . . . .	
<input type="radio"/> 2	Rented-in	. . . . .	
<input type="radio"/> 3	Other (occupied, borrowed for free, including common land managed by the holding)	. . . . .	
	<b>Total area of the holding</b>	. . . . .	
<input type="radio"/> 4	Owned and rented-out (not operated by the holding)	. . . . .	

Land tenure refers to the arrangements or rights under which the holder operates the land that makes up the holding. This question refers to whether the agricultural holding is operated under specific land tenure types. A holding may have one or more tenure types.

Respondent should first inform the enumerators about each **land tenure type of the holding**. For each of them, it is then asked to record the area of the holding under a specific land tenure type, as previously specified. Four main types of land tenure arrangements are identified:

1. Owned and operated (code 1);
2. Rented-in (code 2);
3. Other (occupied, borrowed for free, etc.) (code 3);
4. Owned and rented-out (code 4).

The last column of question II.1 is used to record the unit of measurement according to which the area, under a specific land tenure type.

Once all information has been recorded, enumerators must calculate, in a block note, the total area of the holding by adding up the area that is owned and operated (code 1), rented-in (code 2) and other (code 3). The area of the holding that is rented-out is recorded but subtracted from this calculation as these areas are

not operated by the holding. Enumerators must record the total area of the holding by adding up the area from code 1, 2 and 3.

Box 3 below contains a definition of Land Tenure Type (FAO, 2010), whereas Box 4 and Figure 1 define the area of the holding with breakdown by parcels of land.

### Box 3: Land tenure type

The 4 main types of land tenure arrangements identified are:

1. **Owned and operated:** The holder or members of the holder's household possess title of ownership, which gives the holder the right to sell/mortgage/lease and determine the nature and extent of the use of the land parcels.
2. **Rented-in:** The land is held under conditions that enable it to be operated as if legally owned by the holder or members of the holder's household. This type of legal owner-like possession is where land is operated under long or short-term lease, with nominal rent.
3. **Other (occupied, borrowed for free, etc.):** The holder has operated the land without interruption for a long period without any form of legal ownership, title, long-term lease, or payment of rent or the land is operated under a system in which a rent-free land is received and retained as long as it is kept under cultivation by the recipient's personal and household labor, but which cannot be sold or mortgaged.

**The above three types of land tenure arrangements make up the total agricultural area of the holding. However, the agricultural holding may rent out some of the land owned by the holding to someone else:**

4. **Owned and rented-out:** Rented land to someone else means land that is rented or leased out by the holding to other persons/holdings, usually for a limited time period. Rental arrangements can short or long term and may take different forms. Land may be rented for an agreed sum of money and/or produce, for a share of the produce, or in exchange for services. Land may also be granted rent free.

### Box 4: Area of the holding by land tenure type

For the purposes of this questionnaire, a holding is divided into different land areas depending on the land tenure type under which a given land area is recorded. For each type of land tenure arrangement, interviewer must first write down all the land tenure type (e.g. owned, rented-in etc.) and then record the corresponding area under a given land tenure type (including the corresponding standard or non-standard unit of measurement).

In general, the agricultural area of the holding can be divided into parcels. A parcel is any piece of land, of one land tenure type, entirely surrounded by other lands, water, road, forest or other features not forming part of the holding or forming part of the holding under a different land tenure type. A parcel may consist of one or more fields or plots adjacent to each other. This implies that a distinction should be made between a parcel, a field and a plot. A field is a piece of land in parcel separated from the rest of the parcel by easily recognizable demarcation lines, such as paths, cadastral boundaries and/or hedges. A field may consist of one or more plots, where a plot is a part or whole of a field on which a specific crop or crop mixture is cultivated. Figure 1 below shows the total area of a given agricultural holding. Assuming that 2 parcel are owned (parcel 1 and 2), a third parcel is rented out (parcel 3) and a fourth parcel is rented-in, interviewer will report that total area owned as calculated by adding up the land size of parcel 1 and 2. The total agricultural area of the holding will also be comprised of the fourth parcel, the one rented-in. The area of the holding which is rented-out, instead, is made up of parcel 3 but will not be part of the total agricultural area of the holding. Therefore:

Total agricultural area of the holding = Parcel 1 + Parcel 2 + Parcel 4



- 5a Permanent crops (more than one year) under greenhouses or high shelters
- 5b Permanent crops (more than one year) outdoors or under low shelters
- 6 Permanent meadows and pastures
- 7 Farm buildings and farmyards
- 8 Forest and other wooded land
- 9 Aquaculture on the holding (area not counted elsewhere)
- 10 Other areas not elsewhere classified (unutilized, rocks, wetlands, including with natural vegetation)

Codes from 1a to 6 are used to calculate the agricultural area of the farm. It is important to know that the land area of the holding that is not cultivated but is covered by natural or diverse vegetation falls under the category of “Other areas not elsewhere classified” (Code 10).

It is important to accurately collect the total area under a given land use type (see box 5). The aggregation of the agricultural land area associated with codes from 1 to 6 is used to calculate the denominator of sub-indicator 1: farm output value per hectare of land. Box 5 and 6 below provides a description of each land use type as per WCA 2020.

## Box 5: Definitions of land use types

The below Land Use Classification is based on the World Programme for the Census of Agriculture 2020 (WCA 2020) and harmonized with the System of Environmental-Economic Accounting (SEEA)-Central Framework, designed for covering the whole territory of a country. For the purposes of this survey, a slight adaptation was carried out in order to keep Greenhouses and Land in family gardens (both permanent and temporary) as a sub-category of lands under temporary/permanent crops. It is recommended that the above 10 basic land use classes are identified and listed in the survey. **It is important for the interviewers to get familiar with the classification of land use types and explain it to respondents. A definition of each land use types is as follows:**

- 1. Land under temporary crops** includes all land used for crops with a less than one-year growing cycle; that is, they must be newly sown or planted for further production after the harvest. Some crops that remain in the field for more than one year may also be considered temporary crops. For example, strawberries, pineapples and bananas are considered to be annual crops in some areas. Such crops could be classified as temporary or permanent according to the custom in the country.
- 2. Land under temporary meadows and pastures** includes land temporarily cultivated with herbaceous forage crops for mowing or pasture. A period of less than five years is used to differentiate between temporary and permanent meadows and pastures. If country practice differs from this, the country definition should be clearly indicated in census reports.
- 3. Land temporarily fallow** refers to arable land at prolonged rest before re-cultivation. This may be part of the holding's crop rotation system or because the normal crop cannot be planted because of flood damage, lack of water, unavailability of inputs or other reasons.
- 4. Land under permanent crops** refers to: land cultivated with long-term crops which do not have to be replanted for several years; land under trees and shrubs producing flowers, such as roses and jasmine; and nurseries (except those for forest trees, which should be classified under "forest and other wooded land"). Land under permanent meadows and pastures is excluded from land under permanent crops.
- 5. Land under permanent meadows and pastures includes** land used permanently (for five years or more) to grow herbaceous forage crops, through cultivation or naturally (as wild prairie or grazing land). Whether land under permanent meadows and pastures is cultivated or naturally grown has important environmental implications.
- 6. Land under farm buildings and farmyards** refers to surfaces occupied by operating farm buildings (hangars, barns, cellars, silos), buildings for animal production (stables, cow sheds, sheep pens, poultry yards) and farmyards. Area under the holder's house (including the yard around it) is also classified here if it makes up part of the agricultural holding
- 7. Forest land** is land spanning more than 0.5 ha with trees higher than 5 metres (m) and a canopy cover of more than 10 percent, or trees that are able to reach these thresholds in situ. It covers both natural and plantation forests. It includes forest roads, firebreaks and other small open areas, as well as areas that are temporarily not under trees (due to clear-cutting as part of forest management practice, abandoned shifting cultivation or natural disasters) but are expected to revert to forest within five years (in exceptional cases, local conditions may justify the use of a longer time frame). Windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 ha and width of more than 20 m are included. Forest tree nurseries that form an integral part of the forest should be included. **Other wooded land** is land spanning more than 0.5 ha with: (i) trees higher than 5 m and a canopy cover of 5 to 10 percent, or trees able to reach these thresholds in situ; or (ii) trees not able to reach a height of 5 m in situ but with a canopy cover of more than 10 percent (e.g. some alpine tree vegetation types, arid zone mangroves, etc.); or (iii) combined cover of shrubs, bushes and trees of more than 10 percent.
- 8. Area used for aquaculture** includes area (land, inland waters or coastal waters) for aquaculture facilities, including supporting facilities. Aquaculture refers to farming of aquatic organisms such as fish, molluscs, crustaceans, plants, crocodiles, alligators and amphibians. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc.
- 9. Other area not elsewhere classified** includes all other areas on the holding that are not elsewhere classified. It includes uncultivated land producing some kind of utilizable vegetable product, such as reeds or rushes for matting and bedding for livestock, wild berries, or plants and fruit. It also includes land which could be brought into crop production with a little more effort than that required for common cultivation practices. Also included under this category: land occupied by non-farm buildings; parks and ornamental gardens; roads or lanes (except forest roads, which are included in forest); open spaces needed for storing equipment and products; wasteland; land under water not used for aquaculture; and any other area not reported under previous classes (such as marshlands, wetlands, etc.)



### Box 6: Definitions of land use types

The nine land use classes can be grouped as follows:

Land use classes	Aggregated land classes			
1.Land under temporary crops	Arable lands	Crop land	Agricultural land	Land used for agriculture
2.Land under temporary meadows and pastures				
3.Land temporarily fallow				
4.Land under permanent crops				
5. Land under permanent meadows and pastures				
6. Land under farm buildings and farmyards				
7. Forest and other wooded land				
8. Area used for aquaculture				
9.Other area not elsewhere classified				

### Box 7: Measuring the land area

It is important to know that total area of holding is the area of all the land making up the agricultural holding. It includes all land operated by the holding without regard to title or legal form. **Thus, land owned by members of a household but rented to others should not be included in the area of the holding. Conversely, land not owned by members of a household but rented from others for agricultural production purposes should be included in the holding area.** In this question it is also asked non-agricultural areas of the holding, i.e. forest and other wooded land and area used for aquaculture which, despite not being used for agricultural purposes, belong to the holding.

Note that the area of holding may be zero, such as where the holding keeps livestock but has no land; this is called a landless holding.

In this question, interviewers will ask the farmer to estimate the size of the land area that belong to the holding itself over the last agricultural season, both agricultural and non-agricultural area. Interviewers make sure not to include the area which is rented out. The estimate of the total agricultural and non-agricultural area of the holding must reconcile with the total area of the holding which is owned, rented-in and other type of land tenure arrangement (which is not rented out), as per question A.1.

Many smallholders are likely to give areas as acres and as fractions of acres, probably not more detailed than  $\frac{3}{4}$ ,  $\frac{1}{2}$ , and  $\frac{1}{4}$  of an acre. Interviewers **MUST** convert the fractions to decimals as follows:  $\frac{3}{4}=0.75$ ,  $\frac{1}{2}= 0.50$  and  $\frac{1}{4} =0.25$ , and fill in the areas with two decimals. Interviewers **MUST** make sure that the decimals are correctly registered in order to avoid data entry errors at a later stage. Note the following conversions:

**1 acre  $\cong$  4000m<sup>2</sup>  $\cong$  0.4 hectares**

**1 hectare  $\cong$  10,000m<sup>2</sup>  $\cong$  2.5 acres**

If any local area measurement unit is used, it should be converted into acres before and then into hectares; and finally recorded in the last column. The following guidelines can be used:

- An acre is a measure on the ground of approximately 70 yard (yd) x 70 yd or half a standard football field;
- By casually walking round a square of 50 steps by 50 steps, one covers an area of approximately  $\frac{1}{4}$  or 0.25 acres;
- An area measuring 22 yd x 22 yd covers 0.1 acres; and
- An area measuring 16 yd x 16 yd covers 0.05 acres.

**with others)**

Reference year: Last calendar year

- 1 Yes  
 2 No

Common lands are defined as those lands used collectively by a number of persons, or by one person, but over which other people may have certain traditional rights, such as livestock grazing. Common lands are usually owned by the State, by local communities, etc.

This question is asked with reference to the last calendar year. It collects information on total area of the holding which is under common use. Enumerators record information on the common land area when used exclusively and managed by the holding.

**It is important to record only those common lands that are exclusively managed by the holding and not those used by different agricultural holdings without any management arrangement.**

**II.4 Do you confirm that the area calculated corresponds to the holding's total area (II.1=II.2)?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes  
 2 No → Go back to II.1

This Yes/No question ascertains whether the holding's total area recorded by the enumerators corresponds to the effective area of the holding, as reported in questions II.1 and II.2.

More specifically, this question is asked to double check whether the actual area of the holding corresponds to the total recorded area of the holding. This filter question allows for a Yes/No answer. In case of negative answer, enumerators go back to Section II and ask again questions from II.1 to II.4, making sure to properly record information on land use type and tenure. In case of positive answer, the enumerators proceed with the interview and ask questions in **section A**.

## Section A: Economic Dimension of the Holding

This section collects information on the agricultural production and provides a measure of the holding's economic situation. Information on the agricultural production (in monetary value) and other on-farm production, i.e. production that is not strictly agriculture related but linked to the holding's agricultural activities (e.g. processing of agricultural products) are recorded in this section, which is made up of 8 questions.

**Introduction to question A.1-A.6.** Questions from **A.1** to **A.6** collect information on crop and livestock harvested and produced quantities during the reference period. It also provides information on the main agricultural activity of the holding and it allows deriving the total value of agricultural production of the holding, including the value of production from other on-farm activities. Filter questions are added in order to avoid unnecessary burden to respondents.

### **A.1 From an economic perspective, what is the holding's main agricultural focus?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Mainly crop production (represents more than 2/3 of the total value of production)
- 2 Mainly livestock production (represents more than 2/3 of the total value of production) → Go to A.3
- 3 Mix of crop, livestock and other production activities (while each of them represent equal to or less than 2/3 of the total value of production)

This question aims to collect information on the main activities carried out by the holding over the last calendar year. It is important to ask about the main activities in terms of monetary value produced, not time spent. It might be the case that a given holding carried out two activities: the first one, say crop activity, is the one in which the person (holder) spend more time but it produces less monetary value than the one in which less time is spent (say livestock activity). In this case the main agricultural focus will be the one producing a greater monetary value, irrespective of time spent on the activity. Three codes are associated with this question

1. Mainly crop production (represents more than 2/3 of the total value of production)
2. Mainly livestock production (represents more than 2/3 of the total value of production)
3. A mix of crop and livestock production (while each of them represent equal to or less than 2/3 of the total value of production)

Enumerators skip question **A.2** if the main agricultural focus of the holding is livestock (code 2). Yet, enumerators skip question **A.3** if the main agricultural focus of the holding is crop (code 1). In case of holdings focusing on both livestock and crop activities (mixed production) enumerators will ask both question **A.2** and question **A.3**.

The definitions of crop and livestock activities, as per classification provided by the UN-ISIC (International Standard Industrial Classification of the United Nations) are given in Box 8. The definitions of sub-crop activities by ISIC are illustrated in Box 9. Finally, the definitions of sub-livestock activities are in Box 10.

### Box 8: Definition of major crop and livestock

According to the International Standard Industrial Classification (ISIC revision 4) of the United Nations (UN), Agricultural activities are mainly of two types: crop activities and livestock activities. The interviewer must ascertain that the respondent is familiar with the concept of crop and livestock production as per below example:

- ✓ The production of crop products: covering also the growing of genetically modified crops-- include growing of non-perennial crops and perennial crops, such as growing of cereals, leguminous crops and oil seeds in open fields, including those considered organic farming and the growing of genetically modified crops etc. Further typologies of crop production include growing of rice vegetables and melons, roots and tubers; growing of sugar cane, growing of tobacco; and finally growing of fibre crops.
- ✓ The production of animal products --covering also the raising of genetically modified animal—include raising of cattle and buffaloes; raising of horses and other equines; raising of camels and camelids; raising of sheep and goats; raising of swine/pigs; raising of poultry; and finally raising of other animals. Products derived from raising one or more of the above animals are also included in the livestock production.
- ✓ Mixed farming; i.e. mix of crop and livestock production, breaks with the usual principles for identifying main activity. It accepts that many agricultural holdings have reasonably balanced crop and animal production and that it would be arbitrary to classify them in one category or the other.

Available at: [https://unstats.un.org/unsd/publication/seriesm/seriesm\\_4rev4e.pdf](https://unstats.un.org/unsd/publication/seriesm/seriesm_4rev4e.pdf)

### Box 9: Definitions of key terms (Crops)

- ✓ **Production of annual field crops (cereals, oilseeds, protein crops, root crops, tobacco, cotton, etc.):**  
This group includes the growing of perennial crops, i.e. plants that lasts for more than two growing seasons, either dying back after each season or growing continuously. Included is the growing of these plants for the purpose of seed production.
- ✓ **Production of vegetables, mushrooms, flowers, ornamental plants, etc.**  
This class includes the production of all vegetative planting materials including cuttings, suckers and seedlings for direct plant propagation or to create plant grafting stock into which selected scion is grafted for eventual planting to produce crops.  
**This class includes:**  
Growing of plants for planting  
Growing of plants for ornamental purposes, including turf for transplanting  
Growing of live plants for bulbs, tubers and roots; cuttings and slips; mushroom spawn  
Operation of tree nurseries, except forest tree nurseries
- ✓ **Production of grapes for wine**  
Growing of wine grapes and table grapes in vineyards
- ✓ **Production of other perennial crops (cacao, coffee, etc.)**  
**This class includes:**  
Growing of rubber trees  
Growing of Christmas trees  
Growing of trees for extraction of sap  
Growing of vegetable materials of a kind used primarily for plaiting
- ✓ **Mixed cropping (no dominance of a specific crop activity)**  
Country level definition may be used.

### Box 10: Definitions of key terms (Livestock)

✓ **Raising ruminant livestock for meat (cattle, sheep goats)**

This class includes:

- raising and breeding of cattle, buffalo, sheep, goat, etc.

✓ **Raising non-ruminant livestock for meat (pigs, poultry, etc.)**

This class includes:

- raising and breeding of poultry:

✓ **Production of eggs**

Self-explanatory

✓ **Production of milk**

Self-explanatory

✓ **Mixed livestock (no dominance of a specific livestock activity)**

Country level definition may be used.

### **A.2 What was the total value of crops and its by-products produced by the holding?**

Reference year: Last calendar year

(Fill in all that apply)

Name the 5 main crops and crops by-products produced by the holding and their total value (maximum 5)

		Crop name	Area	Unit of measure	Quantity Produced	Quantity unit of measure	Average or latest Price per unit	Total Value of Production
<input type="radio"/>	1							
<input type="radio"/>	2							
<input type="radio"/>	3							
<input type="radio"/>	4							
<input type="radio"/>	5							

		Crop by-products name	Quantity Produced	Quantity unit of measure	Average or latest Price per unit	Total Value of Production
<input type="radio"/>	1					
<input type="radio"/>	2					
<input type="radio"/>	3					
<input type="radio"/>	4					
<input type="radio"/>	5					

This question collects information on total value of crop and its by-products, which is total quantity of each crop and by-product produced multiplied by its respective average or last farm gate price. Total monetary value of crops and by-product is obtained by adding up the total monetary value of all the crops (and its by-product) harvested by the holding. This question also collect information on the area used for a given crop and the number of varieties of the same crop on a given area.

In question **A.2**, enumerators will fill in two tables. The first one is meant to record the quantity and corresponding prices of crops produced by the holding. The second records the quantity and prices of its by-product produced. Data is collected on maximum of 5 crops and 5 by-products.

In question **A.2**, each row refers to one Crop or By-Product. If the holding grows multiple crop commodities, they should be listed separately (for example, maize and beans will be on different rows).

**NOTE. Question A.2 is about crop and its by-products. Do not include livestock animal and its by-products. Skip this question if the main agricultural focus of the holding is livestock (code 2 in question A.1)**

- List up to 5 major crops produced by the holding (1<sup>st</sup> column).
- Report area used to cultivate the listed crops (2<sup>nd</sup> column).
- Record the unit of measurement of the area used for each crop (3<sup>rd</sup> column).
- Quantity produced for each crop (4<sup>th</sup> column).
- Unit of measurement of the quantity produced for each crop (5<sup>th</sup> column).
- Average or last farm gate price (6<sup>th</sup> column). The price must be aligned with the unit of measurement used to record the quantity of a specific crop and/or by-products (e.g. price per Kg, grams etc.). In case the crop or its by-products are self-consumed, implicit price are used as if the commodities were sold in the market.
- Total value of production in local currency unit (7<sup>th</sup> column).

### Box 11: Crops

Comprehensive list of crop commodities needs to be established at the country level. Nonetheless, list of crop commodities can be extracted from the ISIC rev.4 classification, see table below:

Crops	
Avocado	Orange
Banana	Paprika
Beans.	Pawpaw/papaya
Cabbage	Peach.
Cassava	Pearl millet
Coffee	Pigeon pea
Cotton	Pineapple
Custade apple	Rice
Finger millet{	Sorghum
Fodder trees	Soybean
Ground bean	Sugar cane
Groundnut.	Sunflower
Guava	Sweet potato
Lemon	Tanaposi
Maize	Tea
Mango	Tobacco
Mexican apple	Tomato
Naartje (tangerine)	Wheat
Onion	Other (specify)

#### Example: Crop by-products:

Wheat - Stalks
Rice – Straw / Husk
Cotton – Sticks
Sugar cane – Tops
Maize – Stalks / straw
Mustard – Straw



### A.3 What was the total value of livestock and its products production of the holding?

Reference year: Last calendar year

(Fill in all that apply)

Name the 5 main livestock and livestock products produced by the holding and their total value (maximum 5)

	Livestock animal name	Number of heads at the beginning of the years (Stock + Live births)	Number of heads bought or received during the year	Number of heads given away, dead, or slaughtered during the year	Number of heads sold, paid to labor, rented out or exchanged during the year	Number of heads at the end of the year	Average or latest Price per unit	Total Value of Production
<input type="radio"/> 1								
<input type="radio"/> 2								
<input type="radio"/> 3								
<input type="radio"/> 4								
<input type="radio"/> 5								

	Livestock product name	Quantity Produced	Quantity unit of measure	Average or latest Price per unit	Total Value of Production
<input type="radio"/> 1					
<input type="radio"/> 2					
<input type="radio"/> 3					
<input type="radio"/> 4					
<input type="radio"/> 5					

This question is asked with reference to the last calendar year and records information on total value of livestock production, which is the quantity of each animal sold (or its by-products) multiplied by the corresponding average or last farm gate prices. Total value of livestock production is obtained by adding up the monetary value of each single livestock and its by-product produced by the holding.

In question A.3, enumerators will fill in two tables. The first one is meant to record the number of animals owned by the holding. The second one records the amount of products that are produced by the raising of different types of animals.

**Table 1 of question A.3** (Livestock animals' names):

**Each row refers to one animal** owned by the holding. If the holding has multiple animals, they should be listed separately in each row (for example, cattle, goat etc.).

**NOTE.** Table 1 of question A.3 is about livestock animals. **Do NOT include livestock by-products.** Skip this question if the main agricultural focus of the holding is crop (code 1 in question A.1)

The enumerators begin by asking the respondent for the number of each type of [ANIMAL] owned by the holding as of start date of the last agricultural year. **If additional animals have been added within the last calendar year, they should be included in the count. If animals have been sold or slaughtered during the past calendar year, they should be excluded.**

- List up to 5 major livestock animals (first column). The enumerator must begin by asking the respondent to break down the number of animal owned by species.
- Number of animals born in the last agricultural year (second column).
- Number of animals received as a gift or bought (third column).
- Number of animals died and slaughtered (fourth column).
- Number of animals sold, used as pay or wages for labor, given to landlord as rent or given for other reasons or exchanged (fifth column).
- Average or last market price per head of animal. In case animals were not sold over the last agricultural year, an implicit farm gate price **should be used. This is done by asking the respondent "what would have been the price if you had sold that animal"?**
- Total value of production of the livestock is recorded in the last column.

**Table 2 of question A.3 (Livestock products):**

**Each row refers to one livestock product produced.** If the holding has produced multiple products by the raising of animals, they should be listed in separate rows (e.g. milk, eggs, etc.).

NOTE. Table 2 of question A.3 is about livestock product. Do NOT include livestock animals. Skip this question if the main agricultural focus of the holding is crop (code 1 in question A.1)

- Enumerators begin by asking the respondent to list up to 5 major livestock product (first column).
- The amount of products produced by the raising of animals over the last calendar year prior to the date of the interview is recorded in the second column.
- These measurements should be in standard international units (such as litres or kilograms), not in local units.
- Once the amount of products has been recorded the respondent should inform the enumerator about the average or last farm gate price of each product – recorded in local currency unit – in the last calendar year. The price must be aligned with the unit of measurement used to record the amount of animal products produced by the holding (e.g. price per Kg, grams, litres, etc.)

**Box 12: Livestock animals and by-products**

In general, a comprehensive list of livestock animals and livestock products must be established at the country level, taking into account country specificities. Nonetheless, list of livestock animals and livestock products can be extracted from the ISIC rev.4 classification, as per the below table:

<b>Livestock Animals</b>	<b>Livestock By-Products</b>
Calf	Milk
Steer/heifer	Chicken eggs
Cow	Guinea fowl eggs
Bull	Meat
Ox	Skins and hides
Donkey/mule/horse	Manure
Goat	Other (specify)
Sheep	
Pig	
Chicken-layer/	
Chicken-broiler	
Local-hen	
Local-cock	
Turkey/guinea fowl	
Duck	
Dove/pigeon	
Other (specify)	

**A.4 For each species of animal (max. 3) that are raised on this agricultural holding, list the different breeds and the number of animals they represent**

Reference year:    Last calendar year  
 (Leave it blank if none )

		Species Name	Breeds/Crossbreed Name	Number of animals
○	1	.....	1	
		.....	2	
		.....	3	
○	2	.....	1	
		.....	2	
		.....	3	
○	3	.....	1	
		.....	2	
		.....	3	

This question is asked with reference to the last calendar year. In this question enumerators must record all of the animal species that belong to the holding in the first column. For each animal species, the different breeds are reported in the second column, with the corresponding total number of each breed are recorded in the third column. The percentage can be calculated accordingly. The example in Box 13 below clarifies how data should be collected and recorded. It is important to report only the national list of locally adapted breeds, as agreed with country experts.

Note: if no animals are raised in the holding, enumerators must leave question **A.4** blank

### Box 13: Definitions of key terms

According to FAO (<http://www.fao.org/dad-is/en/>), there are around 8,800 livestock breeds of 38 different species in the world, providing a diversity of products and services.

Table below provides the list of animal species from the Domestic Animal Diversity Information System (DAD-IS) of FAO. For each animal species, each country has its own animal breeds.

Alpaca	Horse
American Bison	Llama
Ass	Nandu
Bactrian camel	Partridge
Buffalo	Peacock
Cassowary	Pheasant
Cattle	Pig
Chicken	Pigeon
Chilean Tinamou	Quail
Deer	Rabbit
Dog	Sheep
Dromedary	Turkey
Duck	Vicuna
Emu	Yak
Goat	
Goose	
Guanaco	
Guinea fowl	

The following example is extracted from the list of animal species and breeds in Malawi, using information available at <http://www.fao.org/dad-is/browse-by-country-and-species/en/>.

	Species Name	Breeds/ Crossbreed Name	Number of heads	%
<input type="radio"/>	1 Cattle	1 Boran 2 Friesian 3 Simmental	3 4 10	
<input type="radio"/>	2 Chicken	1 Ross 2 Ross Indian River 3 Tokai	21 4 1	
<input type="radio"/>	3 ...	1 2 3		

**A.5 Did the holding carry out other on-farm activities than crops and livestock production? (e.g. aquaculture, agroforestry etc. read the list)?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes  
 2 No

→ Go to A.7

The objective of this Yes/No question is to collect information on whether (or not) the holding has diversified its agricultural activities (as identified in question A.2 and A.3: crop and livestock) by carrying out activities that, despite not being of agriculture type, are strongly associated to the main crop and/or livestock activities of the holding. On-farm activities that are not crops and livestock generally comprise of on-farm processing of agricultural products (e.g. manufacture of crude vegetable oil: olive oil, soybean oil, palm oil, sunflower seed oil, cottonseed oil, rape, colza or mustard oil, linseed oil, etc.).

Box 14 below lists all on-farm activities carried out by the holding and which are not crop or livestock production. Enumerators must read out the below on-farm activities after having asked question A.5

The following codes are associated with question A.5. Skip question A.6 if code in A.5 is 2 (No).

- 1 Yes  
 2 No

**Box 14: Other On-farm activities**

Other on-farm activities may represent a substantial share of the holding’s activities (in terms of income). The question is limited to the holding’s activities and excludes the activities of household members and/or external workers carried out outside of the holding. A comprehensive list of relevant activities is illustrated below.

<b>1. On-farm processing of agricultural products:</b>
• Grain milling: production of flour, groats, meal or pellets of wheat, rye, oats, maize (corn) or other cereal grains
• Rice milling: production of husked, milled, polished, glazed, parboiled or converted rice; production of rice flour
• Processing and preserving of fruit and vegetables
• Manufacture of crude vegetable oil: olive oil, soya bean oil, palm oil, sunflower seed oil, cottonseed oil, rape, colza or mustard oil, linseed oil, etc.
• Manufacture of wine
• Distillation of spirit drinks
• Manufacture of tobacco products (cigars, chewing tobacco, etc.)
• Processing and preserving meat
• Manufacture of dairy products
• Manufacture of leather and related products
<b>2. Selling of holding's products at the market/shop (incl. preparation, packaging and transport of processed products)</b>
<b>3. Production of forestry products</b>
<b>4. Production, processing and preserving of fish, crustaceans and molluscs</b>
• Production of fish, crustaceans and molluscs
• Processing and preserving of fish, crustaceans and molluscs
<b>5. Production of renewable energy</b>
<b>6. Contractual work for other holdings using the production means of this holding</b>
<b>7. Accommodation, restaurant, catering and other leisure/educational activities</b>
<b>8. Making handicrafts</b>
<b>9. Training of animals</b>
<b>10. Management and/or administration for the agricultural holding</b>
<b>11. Other (specify)</b>
<b>12. None</b>

Reference year: Last calendar year  
(Fill in all that apply)

Name the main 5 on-farm productions (other than crops and livestock) and their total value (e.g. aquaculture, agroforestry etc.)

	Other on-farm products name	Quantity Produced	Quantity unit of measure	Average or latest Price per unit	Total Value of Production
<input type="radio"/> 1					
<input type="radio"/> 2					
<input type="radio"/> 3					
<input type="radio"/> 4					
<input type="radio"/> 5					

This question collects information on total value of production from other on-farm, which is the quantity of each on-farm products multiplied by the corresponding average or last farm gate price. Total value of on-farm production is obtained by adding up the monetary value of each single on-farm product produced by the holding over the last calendar year. In question **A.7**, each row refers to one on-farm product.

**NOTE. Question A.6 is about on-farm products. Do NOT include crops, livestock animal and its products. Skip this question if the code in question A.5 is 2 (no) and go to A.7.**

- Enumerators must begin by listing up to 5 major on-farm products produced by the holding (first column).
- In the second column, records unit of measurement.
- The third column records the quantity produced of each listed on-farm product
- Fourth column capture the average or last farm gate price for each on-farm product. The price must be aligned with the unit of measurement used to record the quantity of commodities (e.g. price per Kg, grams etc.). In case some on-farm products were only own-consumed, the recorded price should be the price if those products would have been sold in the market.
- The last column records the total value of production.

The list of on-farm products is given in box 15 below.

**Box 15: Example of other On-Farm Products**

Production of:	Flour
Production of:	Meal
Production of:	Pellets of wheat
Production of:	Rye
Production of:	Oats
Production of:	Maize
Production of:	Other cereal grains
Production of:	Husked
Production of:	Milled
Production of:	Polished
Production of:	Glazed
Production of:	Parboiled or converted rice
Production of:	Production of rice flour
Production of:	Fruit
Production of:	Vegetables
Manufacture of:	Olive
Manufacture of:	Vegetable oil
Manufacture of:	Soybean
Manufacture of:	Palm
Manufacture of:	Sunflower
Manufacture of:	Cottonseed
Manufacture of:	Wine
Manufacture of:	Tobacco
Manufacture of:	Dairy products
Manufacture of:	Leather
Processing and preserving:	Meat

**Introduction to Question A.7.** Question A.7 records information on profitability of the holding. Such information is meant to measure, monitor and assess the economic performance of the holding over the past three calendar years.

**A.7 How often was this holding profitable? (Profitable means that value of production was greater than total cost both fixed and variable)**

Reference year: Last 3 calendar years

(Fill in one circle only)

- 1 Unprofitable for all three years
- 2 Profitable in one out of the three years
- 3 Profitable in two out of the three years
- 4 Profitable in three out of the three years

This question is asked to record information on how many times over the past 3 calendar years prior to date of the interview the agricultural holding made profit. The concept of profit implies that the total revenues were greater than fixed and variable costs of production, as per below formula.

$$\pi_i = (\text{Revenue i.e. } p_i * q_i) - (\text{total cost of production}_i) \quad [1]$$

Where  $\pi_i$  is the profit of the  $i$  – th holding,  $(p_i * q_i)$  is the revenue of the holding (farm gate prices multiplied by quantity produced). A profitable holding implies that the difference between revenues and cost of production is non-negative (either 0 or greater than 0).



The enumerators should ask question A.7 carefully and record the information on how often the agricultural holding was profitable. The enumerators should ensure the total cost of production also comprises the fixed and variable costs associated with production. Four codes are possible for this question:

- 1      **Unprofitable for all three years**
- 2      **Profitable in one out of the three years**
- 3      **Profitable in two out of the three years**
- 4      **Profitable in three out of the three years**

#### **Box 16: Definition of key terms**

**Profitable** agricultural holdings are those having a positive profit. Profitability here is measured using **Net Farm Income** that the holding is able to earn from farming operations. The focus of **Net Farm Income** sub-indicator is on income from farming operations as opposed to total income of the holding household which may include income from other sources e.g. employment in local businesses by other family members, tourism activity, etc. While these other sources of income are important in the context of assessing the sustainability of living in rural areas, they are not of direct relevance in the assessment of the sustainability of agriculture.

**Gross Farm Income** refers to the monetary and non-monetary income received by farm. Its main components include cash receipts from the sale of farm products, direct program payments to producers, other farm income (such as income from custom work), value of food and fuel produced and consumed on the same farm, and change in value of year-end inventories of crops and livestock.

**Net farm Income** refers to the return (both monetary and non-monetary) to farm operators for their labor; management and capital, after all production expenses have been paid (that is, Gross Farm Income minus production expenses). It includes net income from farm production, the value of commodities consumed on the farm, depreciation, and inventory changes.

In order to make sure that respondents are aware about the distinction between **Gross** and **Net Farm income** (i.e. profit), interviewers can ask again how many times during the past 3 years the value of products sold was greater than the total operating cost of the business. Further, interviewers can ask how much did the holding spend on all operating expenses during year 1, 2 and 3 and write the corresponding value of expenses in a block note. In the same way, interviewers ask how much did the holding received during years 1, 2 and 3 in monetary value form sales of the all commodities produced. The Net Farm Income can be calculated as the difference between self-reported sales and self-reported total operating expenses.

Estimating profitability at a farm level will generally require compilation of basic farm financial records, i.e. daily, weekly, monthly or seasonal transactions in an organized way. In general, large commercial farms maintain detailed financial records however, in case of medium farms and small subsistence agriculture, record keeping is seldom practiced and in most of the countries it doesn't exist at all. Where the detailed data ideally required are not available at farm level especially in case of small holders and household sector, then:

- Estimates will be developed based on farmer declaration of outputs and inputs quantity (and appropriate prices) and/or sales and purchases.
- Depreciation, variation in stocks and taxes will be neglected in this case.

### Box 16 (cont'd): Definition of key terms

If the required information is available, Net Farm Income is better calculated according to the methodology developed by Statistics Canada (available at <https://www150.statcan.gc.ca/n1/en/pub/21-010-x/21-010-x2014001-eng.pdf?st=8V1ikX6>). The following formula is applied:

$$NFI = CR + Y_k - OE - Dep + \Delta In \quad [1]$$

Where:

- **NFI = Total Net Farm Income**
- **CR = Total farm cash receipts including direct program payments**
- **$Y_k$  = Income in kind**
- **OE = Total operating expenses after rebates (including costs of labor)**
- **Dep = Depreciation charges**
- **$\Delta$  Inv = Value of inventory change.**

The below table enlists all costs and revenues associated with agricultural production, as per formula 1 above.

Total revenues = Total farm cash receipts + Direct program payments + Income in kind + Change in inventory	Cost = Operating + Fixed cost + depreciation	Net farm Income
<ul style="list-style-type: none"> <li>• Revenue = Quantity X Prices                             <ul style="list-style-type: none"> <li>- Crops</li> <li>- Livestock</li> <li>- other on-farm activities / products</li> </ul> </li> <li>• Direct program payments</li> <li>• Income in kind</li> <li>• Value of inventory change</li> </ul>	<ul style="list-style-type: none"> <li>• Operating Expenses:                             <ul style="list-style-type: none"> <li>- Labor expenses (Cash wages)</li> <li>- Fertilizers expenses</li> <li>- Pesticides expenses</li> <li>- Fuel expenses</li> <li>- Electricity expenses</li> <li>- Costs for feeding animals</li> <li>- Irrigation cost</li> <li>- Taxes</li> <li>- Others (see pag.30-32 of the above link)</li> </ul> </li> <li>• Depreciation charges</li> </ul>	<p><b><math>NFI = revenues - cost</math></b></p>

**Introduction to question A.8.** Question A.8 collects information on external shocks or unforeseen events-- that negatively affected the holding. It is important to solicit more than one coping strategy, if applicable. Filter questions are added in order to avoid unnecessary burden for the respondents.

#### **A.8 Did this holding have access to or availed any of the following mechanisms for protection against external shocks (e.g. drought, floods, pests, market failure, prices and others)?**

Reference year: Last calendar year

(Read all options and fill in all that apply)

- This holding had access to or availed credit (i.e. formal and/or informal) for protection against external shocks
- This holding had access to or availed insurance for protection against external shocks
- Neither the holding had access to nor availed any of the above mechanisms for protection against external shocks

This question collects information on mechanisms that allow the holding to protect itself from potential external shocks. Four types of shocks are listed. Enumerators read and explain these shocks given in **Box 17** before continuing.

### Box 17: External shocks

1. **Drought:** A prolonged period of abnormally low rainfall, leading to a shortage of water.
2. **Flood:** An overflow of a large amount of water beyond its normal limits, especially over what is normally dry land.
3. **Pest:** A destructive insect or other animal that attacks crops, food, livestock, etc. This can include also heat waves
4. **Market shock:** Any demand or supply side shocks that alter the price matching equilibrium in the market e.g. price reduction for the commodities produced by the holding.

The following codes are associated with question **A.8:**

- 1 This holding had access to or availed credit (i.e. formal and/or informal) for protection against external shocks
- 2 This holding had access to or availed insurance for protection against external shocks
- 3 Neither the holding had access to nor availed any of the above mechanisms for protection against external shocks

### Box 18: Shocks coping strategies

1. **Credit:** Credit may have been obtained from a formal/informal sources, such as a banks, relatives or a local money lenders. There has to be an explicit agreement between the lender and the borrower (holding) detailing the terms and conditions of the loan i.e. time of repayment and interest charge on top of the principal amount etc.
2. **Insurance:** Preventive protection measure to protect the holding against external shocks.

## Section B: Environmental Dimension of the Holding

**Skip B.1 to B.16, if A.1=2.** This section collects information on the environmental dimension of the holding and its agricultural area. The aspects covered in this dimension includes: prevalence of soil degradation threats, management of pesticides, management of fertilizers, variation in water availability and adoption of biodiversity-supportive practices.

**Introduction to question B.1-B.2:** These questions are asked in order to collect information on whether the holding has experienced one or more among four listed threats during the past three calendar years. These are: Soil Erosion, Reduction of Soil Fertility, Waterlogging and Salinization of Irrigated Land.

### **B.1 Have you experienced any of the following soil degradation threats on your holding?**

This question is asked with reference to the last 3 calendar years and ascertain if one or more of the threats listed below were experienced by the holding.

Reference year: Last 3 calendar years

(Fill in all that apply)

- 1 Soil erosion (loss of topsoil through wind or water erosion)
- 2 Reduction in soil fertility
- 3 Waterlogging
- 4 Salinization of irrigated land
- 5 Other (specify )
- 6 None of the above

[→ Go to B.3](#)

**Respondents are requested to identify one or more of the above threats. The enumerators must go to question B.3 if the code is 6 “None of the above”.**

#### Box 19. External threats

**Soil Erosion:** Erosion refers to the wearing away of a field's topsoil by the natural physical forces of water and wind. These can be affected, accelerated or reduced as a function of farming activities such as tillage.

**Reduction in soil fertility:** Fertility refers to the capacity of a soil to provide crops with essential nutrients without reduction in productivity over the years. Reduction in soil fertility implies a situation in which the capacity of the soil to provide crops with essential plant nutrients tends to reduce from one year to the other.

**Waterlogging:** Refers to a situation of water stagnation on the land surface or excessive volume of water on the land surface, affecting production.

**Salinization of irrigated land:** Salt accumulation on the land surface.

### **B.2 What is the total area of the holding affected by any of the threats identified above?**

Reference year: Last 3 calendar years

Total area affected

Area								Unit of measure	

Once information on threats have been collected in question B.1, enumerators record the corresponding total agricultural land area affected by one or more of the soil degradation threats.

**Note number 1:** The enumerators carefully record the total area affected by one or more threats by ensuring that the reported affected area is NOT GREATER than the total agricultural area (check question A.2).

**Note number 2:** It might be the case that the two soil degradation threats have affected two separate areas of the holding or the same area of the holding may have been affected by two different threats. Enumerators must report the total area affected, irrespective of whether this is the sum of two different areas of land affected by two different threats, or the same area affected by two different threats.

**Introduction to question B.3-B.5:** These questions gather data to estimate areas under irrigation. The data gathered in this section includes irrigated area, water used and irrigation methods. Skip B3 to B.5 if the farm only carries out livestock activities.

**B.3 Did this agricultural holding use water to irrigate crops?**

Reference year: Last 3 calendar years

(Fill in one circle only)

- 1 Yes (indicate the irrigated area or a percentage of the total area of the holding irrigated)
- 2 No, I don't need irrigation → Go to B.5
- 3 No, I can't afford irrigation → Go to B.5
- 4 No, there is no water available → Go to B.5

Area /Percentage

--	--	--	--	--	--

Unit of measure

--	--	--	--	--	--

This question records information on irrigation during the last 3 calendar years. Four answers are possible for this question, with their corresponding codes provided bellows:

- 1** Yes (indicate the irrigated area or percentage of the total area of the holding irrigated)
- 2** No, I don't need irrigation
- 3** No, I can't afford irrigation
- 4** No, there is no water available

If water was used to irrigate crop (code 1), enumerators ask and record the total area, including the unit of measurement (or the percentage of total area) that was irrigated. Enumerators carefully record the total irrigated area by ensuring that the reported irrigated area is not greater than the total agricultural area.

**Note: enumerators skip questions B.4 and B.5 if the answer given to question B.3 is 2, 3 or 4.**

**Box 20: Water for irrigation**

Water for irrigation may come from various sources, including rivers, dams or wells and water reservoirs, etc. "Irrigation used on the holding" means that water (other than rain) is applied to crops at least once during the entire reference period (last 3 calendar years). Those who reported that the holding used water to irrigate their crops must also inform the interviewer about the land area that was irrigated. The land area irrigated corresponds to the one(s) in which one or more crops were cultivated during the past 3 years, i.e. **the agricultural area irrigated at least once during the reference period**. If the respondent says that crops were irrigated through rain or not irrigated at all, interviews should move to question B.6 (FAO, 2015, para 8.3.2).

**B.4 Are you observing any reduction in water availability from well or other sources i.e. lake, canal and river?**

Reference year: Last 3 calendar years

(Fill in one circle only)

- 1 No, water is always available in sufficient quantity when I need it → [Go to B.6](#)
- 2 Yes, water level in my well(s) is progressively going down
- 3 Yes, water in river, lake or canal is getting scarce and I can't have reliable supply when I need it
- 4 I do not know

This Yes/No question gather information on progressive reduction in water availability from the well or other sources. Codes associated with question B.4 are:

- 1** No, water is always available in sufficient quantity when I need it
- 2** Yes, water level in my well(s) is progressively going down
- 3** Yes, water in river, lake or canal is getting scarce and I can't have reliable supply when I need it
- 4** I do not know

Enumerators go to question **B.6** if the code associated with question B.4 is 1 (No, water is always available in sufficient quantity when I need it).

**Box 21: Sources of Irrigation**

Water can be sourced using different methods:

- 1. Well irrigation is a method of irrigation where underground water is tapped through a well (tube well, open well).
- 2. Water supplied directly by diverting it from the river through canals, or pumping it from a river, lake or groundwater.
- 3. Water can be applied on the field through canals (gravity), sprinklers or micro-irrigation (drip).

**B.5 Are there organizations dealing with water allocation in the area where this holding is located?**

Reference year: Last 3 calendar years

(Fill in one circle only)

- 1 Yes, and they are working well
- 2 Yes, but they are not working well (specify why)
- 3 No, there are none
- 4 No, I don't know

This question collects information on the organizations (both formal and informal) responsible for water allocation in the area where the holding is located. This question also collects information on whether such organization work efficiently. The codes associated with this questions are as follows:

- 1** Yes, and they are working well
- 2** Yes, but they are not working well (specify)
- 3** No, there are none
- 4** No, I don't know

**Note: enumerators must briefly record why organization are not working well (code2). It is advisable to use key terms while explaining the reason why organizations are not working well.**

**Box 22: Water allocation**

In many countries, water allocation to farms is implemented by organization mandated to ensure the delivery of water to different users according to established rules. These organisations are usually called 'Water users organizations', 'water boards', 'Water Districts', etc. They can be public, owned by farmers, or private operators.



**Introduction to question B.6-B.9.** These questions gather information on the use of any synthetic or mineral fertilizer or animal manure/slurry for crops by the holding, its awareness of environmental risks and potential measures adopted to mitigate the risks associated with the use of synthetic and mineral fertilizers

**B.6 Did this agricultural holding use any synthetic or mineral fertilizer or animal manure/slurry for crops?**

Reference year: Last calendar year

(Fill in one circle only)

1 Yes

2 No

[→ Go to B.10](#)

This Yes/No question records information on the use of synthetic or mineral fertilizers during the past calendar year. A definition of synthetic /mineral fertilizers is given in Box 23. While Box 24 provides an explanation of environmental risks associated with the use of synthetic /mineral fertilizers for crops.

**Note: if the answer is “no” (code 2) enumerators must go to question B.10.**

**Box 23: Synthetic or mineral fertilizers**

The most commonly used **synthetic or mineral fertilizers** for agricultural production are:

**1. NITROGEN FERTILIZERS**

- Sodium nitrate
- Ammonium sulphate
- Ammonium nitrate
- Urea
- Ammonium phosphate, dibasic
- Ammonium phosphate , monobasic

**2. POTASSIUM (POTASH) FERTILIZERS**

- Potassium chloride (murate of potash)
- Potassium nitrate.
- Potassium sulphate.

**3. PHOSPHATE FERTILIZERS**

- Di-calcium phosphate, anhydrous
- Bone meal
- Rock phosphate (fluoroapatite)
- Single superphosphate
- Triple superphosphate

**4. CALCAREOUS**

- Calcium carbonate (limestone)
- Calcium oxide (quicklime)

Country customization of the list of synthetic and mineral fertilizers is highly advisable in this question. Note that the survey does not request that the farmers indicate which fertilizer they use.

**Animal manure/slurry for crops**

5. **Manure** is animal faeces rich in nutrients, sometimes mixed with chemicals that is spread on the ground as fertiliser.
6. **Slurry** is created from cow manure and water and provides a natural fertiliser that farmers can use to encourage the growth of grass and other crops. **Slurry** is usually stored in a tank or lagoon before it is applied to farmland as fertiliser.

## Box 24: Environmental risks associated with excessive use of synthetic and mineral fertilizers

### Depletes the Quality of the Soil

Using too much of fertilizers in the soil can alter the fertility of the soil by increasing the acid levels in the soil.

### Pollution of Water bodies

Using too much of fertilizers in the soil leads to eutrophication. Fertilizers contain substances like nitrates and phosphates that are flooded into lakes and oceans through rains and sewage. These substances prove to become toxic for the aquatic life, thereby, increasing the excessive growth of algae in the water bodies and decreasing the levels of oxygen. This leads to a toxic environment and leads to death of fish and other aquatic fauna and flora. Indirectly, it contributes to an imbalance in the food chain as the different kinds of fishes in the water bodies tend to be the main food source of various birds and animals in the environment.

### Climate change

Fertilizers consists of substances and chemicals like methane, carbon dioxide, ammonia, and nitrogen, the emission of which contribute to a great extent in the quantity of greenhouse gases present in the environment. This in turn leads to global warming and weather changes. In fact, nitrous oxide, which is a by-product of nitrogen, is the third most significant greenhouse gas, after carbon dioxide and methane.

## **B.7 Are you aware of the environmental risks associated with the excessive use or misuse use of fertilizer?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes  
 2 No

This Yes/No question collect information on holder's awareness of environmental risks associated with the use of synthetic and mineral fertilizers.

## **B.8 Did this agricultural holding take specific measures to mitigate the environmental risks associated with the use of synthetic and mineral fertilizers?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes  
 2 No

→ [Go to B.10](#)

This Yes/No question collect information on specific measures taken by the holdings to mitigate environmental risks associated with the use of synthetic and/or mineral fertilizers. Enumerators go to question B.10 if answer to B.8 is 2 (No)

## **B.9 If so, which specific measures did the agricultural holding take or adopt?**

Reference year: Last calendar year

(Read all options and fill in all that apply)

- 1 Follow protocols as per extension service or retail outlet directions or local regulations, not exceeding recommended doses  
 2 Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers  
 3 Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs  
 4 Distribute synthetic or mineral fertilizer application over the growing period  
 5 Consider soil type and climate in deciding fertilizer application doses and frequencies  
 6 Use soil sampling at least every 5 years to perform nutrient budget calculations  
 7 Perform site-specific nutrient management or precision farming  
 8 Use buffer strips along water courses.

The following codes are associated with the list of measures to mitigate environmental risks. Box 25 explains the key terms explaining each of the below listed specific measures.

1	Follow protocols as per extension service or retail outlet directions or local regulations, not exceeding recommended doses
2	Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers
3	Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs
4	Distribute synthetic or mineral fertilizer application over the growing period
5	Consider soil type and climate in deciding fertilizer application doses and frequencies
6	Use soil sampling at least every 5 years to perform nutrient budget calculations
7	Perform site-specific nutrient management or precision farming
8	Use buffer strips along water courses

It is important to note that more than one specific measure (taken to mitigate environmental risks associated with the use synthetic and mineral fertilizers) can be specified.

**Note: enumerators must briefly explain what are the measure taken or adopted. It is advisable to use key terms while explaining other measure taken or adopted to mitigate environmental risks associated with the use of synthetic or mineral fertilizers.**

#### Box 25: Key terms

**Follow protocols as per extension service or retail outlet recommendations or local regulations:** These are country- or region-specific protocols released by official bodies or retailers and that provide information on doses to apply and application modalities.

**Organic sources of nutrients:** Nutrient sources are generally classified as organic, mineral or synthetic. Organic nutrient sources are manures, bulky organic manures or organic fertilizers. Most organic nutrient sources, including waste materials, have widely varying composition and often only a low concentration of nutrients, which differ in their availability

**Legumes as a cover crop:** Legumes capture nitrogen from the air and store it in the root zone, thus contributing to nitrogen fertilisation. Commonly used legumes include:

- Winter annuals, such as crimson clover, hairy vetch, field peas, subterranean clover and many others
- Perennials like red clover, white clover and some medics
- Biennials such as sweet clover

**Site-specific nutrient management (SSNM):** a technology that provides guidance to farmers on the distribution of nutrient requirements across plots. SSNM provides savings for farmers through more efficient fertilizer use.

**Soil Sampling:** It involves measuring soil properties correctly through standard laboratory techniques and precise sampling methods. Soil test are used to asses fertility and is analysis of a soil sample to determine nutrient content, composition, and other characteristics such as the acidity or pH level.

**Buffer strips:** A buffer strip is an area of land maintained in permanent vegetation that helps to control soil and water quality and has other environmental benefits  
[https://www.aberdeenshire.gov.uk/media/8127/2015\\_09bufferstripsplanningadvice.pdf](https://www.aberdeenshire.gov.uk/media/8127/2015_09bufferstripsplanningadvice.pdf)

**Introduction to question B.10-B.16.** Question from B.10 to B.16 data on those holdings that, during the past agricultural season have applied pesticides on their agricultural production, as well as on the awareness of the potential risks associated with the use of pesticides and specific measures to mitigate the environmental and health risks associated with the use of pesticides.

**B.10 Did this agricultural holding use any pesticides for crop or livestock production?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes  
 2 No

[→ Go to B.17](#)

This Yes/No question collect information on whether (or not) agricultural holdings used pesticides for their crop or livestock production. **Note: if the answer given is “no” (code 2) enumerators go to question B.17 and skip questions from B.11 to B.16.**

**B.11 What type of pesticides did this agricultural holding used?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Moderately or slightly hazardous  
 2 Highly, extremely hazardous or illegal pesticides

This question collects information on whether agricultural holding used highly/extremely hazardous pesticides/ illegal pesticides or moderately/slightly hazardous pesticides for their crop production.

**A definition of highly hazardous and moderately hazardous pesticides is given in box 26.**

**Box 26: Definition of pesticides and highly hazardous pesticides**

Pesticides products are substances applied to prevent, destroy or control a harmful organism (a “pest”) or disease, or protect plants or plant products during production, storage and transport or protect crops.

They contain at least one active substance and have one of the following functions:

- Protect plants or plant products against pests/diseases, before or after harvest
- Influence the life processes of plants (such as substances influencing their growth, excluding nutrients)
- Preserve plant products
- Destroy or prevent growth of undesired plants or parts of plants

**The meaning of pesticide must clearly be explained by interviewers to respondents and an ideal list of pesticides by brand and type used in the country should be read out in order for the respondent to clearly understand what a pesticide product is.**

According to FAO (<http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/code/hhp/en/>) a considerable proportion of the pesticides still being used in the world can be considered highly hazardous, because they have a high acute toxicity, have known chronic toxic effects even at very low exposure levels, or are very persistent in the environment or in organisms, for example. In particular, in developing countries, Highly Hazardous Pesticides (HHPs) may pose significant risks to human health or the environment, because risk reduction measures such as the use of personal protective equipment or maintenance and calibration of pesticide application equipment are not easily implemented or are not effective.

Highly hazardous pesticides are classified according to the World Health Organization Recommended Classification of Pesticides by Hazard ([http://www.who.int/ipcs/publications/pesticides\\_hazard\\_2009.pdf](http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf)), as having one or more of the following characteristics:

- Pesticide formulations that meet the criteria of classes IA or IB of the WHO Recommended Classification of Pesticides by Hazard; or
- Pesticide active ingredients and their formulations that meet the criteria of carcinogenicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS); or
- Pesticide active ingredients and their formulations that meet the criteria of mutagenicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS); or
- Pesticide active ingredients and their formulations that meet the criteria of reproductive toxicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals (GHS); or
- Pesticide active ingredients and formulations listed by the Rotterdam Convention in its Annex III; or
- Pesticides listed under the Montreal Protocol; or
- Pesticide active ingredients and formulations that have shown a high incidence of severe or irreversible adverse effects on human health or the environment.

Illegal pesticides are those pesticides that have been banned in most countries worldwide because of their persistence in the environment and human toxicity. The list of illegal pesticides is generally made available by national authorities.

**B.12 Are you aware of the environmental and health risks associated with the use of pesticides?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes  
 2 No

This Yes/No question collect information on holder's awareness of potential environmental and health related-risks associated with the use of pesticides.

**B.13 Did this agricultural holding take specific measures to protect people from health-related risks?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes  
 2 No

[→ Go to B.15](#)

This YES/No question collect information on whether specific measures were taken by the holding to mitigate health-related risks associated with the use of pesticides.

**Note: if the answer given is "no" (code 2) enumerators go to question B.15.**

**B.14 Which of the following measures did this agricultural holding adopt to protect people from health-related risks?**

Reference year: Last calendar year

(Read all options and fill in all that apply)

- 1 Adherence to label directions for pesticide use (including use of protection equipment)  
 2 Maintenance and cleansing of protection equipment after use  
 3 Safe disposal of waste (cartons, bottles and bags)

A detailed list of specific measures to protect people from health-related risks is specified in question B.14. Each of the below specified measures is defined in box 27 to facilitate the respondent's comprehension of question B.14. Codes associated with potential measures taken are as follows:

- 1 Adherence to label directions for pesticide use (including use of protection equipment)  
2 Maintenance and cleansing of protection equipment after use  
3 Safe disposal of waste (cartons, bottles and bags)

**Note: enumerators must briefly explain what are the measures adopted. It is advisable to use key terms while explaining other measure adopted to protect people from health-related risks associated with the use of pesticides.**

### Box 27: Definitions of key terms

All pesticides are toxic to some or all living organisms. They are designed to prevent, destroy or control specific plants or animals that threaten crops or other useful resources. However, if beneficial insects or crops are exposed to pesticides they too may be destroyed, and farm animals, wildlife or people may become ill or die after exposure to even very small quantities of pesticide. The following measures allow preventing people from health-related risks.

**Adherence to label directions for pesticide use:** In many countries, pesticide labels are legal documents in that they are required by law to be put on a pesticide package. Generally, also the (minimum) content and format of the label is defined by law. In such cases, all pesticide labels, and any modifications or variations, need to be approved by the responsible authority. As a result, pesticide labels are enforceable and it will be a violation to use a pesticide product in a manner inconsistent with its labelling. Adherence to label recommendations implies that the agricultural holding follows the regulations mandated by the national authority while using pesticides (see also <http://www.fao.org/3/a-i4854e.pdf>)

**Use of personal protection equipment:** the following equipment items are recommended to be used while applying pesticides:

- Protective eyewear – Use of safety glasses with brow, front, and temple protection; or a face shield; or fully-enclosed goggles; or a full-face respirator.
- Goggles – Use of a fully-enclosed, chemical-splash resistant goggles or a full-face respirator.
- Full-Face Respirator – use a tight-fitting, full-face respirator.
- Chemical-resistant coveralls – A one- or two-piece suit that the manufacturer specifies to be resistant to certain chemicals.

**Safe disposal of waste (cartons, bottles and bags):** pesticide containers must take into account all the specific requirements related to the safe handling of pesticides. Containers should allow safe storage, transport, preparation and use of the product, as well as rinsing and disposal of the empty container

### **B.15 Did this agricultural holding adopt specific measures to avoid environment-related risks?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes  
 2 No

→ [Go to B.17](#)

This Yes/No question collect information on whether specific measures were taken by the holding to avoid environment-related risks associated with the use of pesticides.

**Note: if the answer given is “no” (code 2) enumerators go to question B.17.**

**B.16 Which of the following measures did this agricultural holding adopt in relation to pest control? (plant pest and animal diseases)**

Reference year: Last calendar year

(Read all options and fill in all that apply)

- 1 Adherence to label directions for pesticide application
- 2 Adjustment of planting time
- 3 Application of crop spacing
- 4 Application of crop rotation
- 5 Application of mixed cropping
- 6 Application of inter-cropping
- 7 Perform biological pest control
- 8 Use of biopesticides
- 9 Adopting pasture rotation to suppress livestock pest population
- 10 Systematic removal of plant parts attacked by pests
- 11 Maintenance and cleansing of spray equipment after use
- 12 Use one pesticide no more than two times or in mixture in a season to avoid pesticide resistance.

A detailed list of specific measures adopted by the holding to avoid environment-related risks is further specified in this question and defined in Box 28 to facilitate the respondent's comprehension. Codes associated with potential measures adopted are as follows

- 1 Adherence to label directions for pesticide application
- 2 Adjustment of planting time
- 3 Application of crop spacing
- 4 Application of crop rotation
- 5 Application of mixed cropping
- 6 Application of inter-cropping
- 7 Perform biological pest control
- 8 Use of biopesticides
- 9 Adopting pasture rotation to suppress livestock pest population
- 10 Systematic removal of plant parts attacked by pests
- 11 Maintenance and cleansing of spray equipment after use
- 12 Use one pesticide no more than two times or in mixture in a season to avoid pesticide resistance

**Note: enumerators must briefly explain what measure are adopted. It is advisable to use key terms while explaining other measure adopted to avoid environment -related risks associated with the use of pesticides**



### Box 28: Definitions of key terms

**Planting time:** The period of the year that is warm enough for plants to grow. **Adjusting the planting time implies** that a farmer adjusts the period for time to grow in accordance with awareness of a pest's life cycle, which stages are most likely to cause economic damage, and when best to monitor is essential when planning a pest management program. Pest life cycle diagrams indicate when the various pests stages are likely to be found in the crop, management considerations, and critical monitoring periods (available at <https://ipmguidelinesforgrains.com.au/ipm-information/making-informed-control-decisions/pest-life-cycles/>).

**Perform biological control:** Aims to reduce plant pathogens and limit pests such as insects, parasitic nematodes and weeds. In its narrowest sense, biocontrol suppresses pest organisms by using other organisms.

**Crop rotation, mixed cropping or inter-cropping for breaking the pest cycle:** mixed cropping and crop rotation embrace one of the principles of conservation agriculture. Planting of the same crop each season - as sometimes practiced in conventional farming is minimized by planting the right mix of crops in the same field, and rotating crops from season to season. This allows a breakdown of survival and multiplication cycles of pests, diseases and weeds resulting in higher yields and maintenance of soil fertility.

**Preservation of natural biological control services:** is a method of controlling pests such as insects, mites, weeds and plant diseases using other organisms. It relies on predation, parasitism, herbivory, or other natural mechanisms, but typically also involves an active human management role. It can be an important component of integrated pest management (IPM) programs.

**Adherence to label directions for pesticide use:** in many countries, pesticide labels are legal documents in that they are required by law to be put on a pesticide package. Generally, also the (minimum) content and format of the label is defined by law. In such cases, all pesticide labels, and any modifications or variations, need to be approved by the responsible authority. As a result, pesticide labels are enforceable and it will be a violation to use a pesticide product in a manner inconsistent with its labelling. Adherence to label recommendations implies that the agricultural holding follows the regulations mandated by the national authority while using pesticides (see also <http://www.fao.org/3/a-i4854e.pdf>).

**Introduction to question B.17-B.20.** These questions gather data on the level of adoption of biodiversity-supportive practices by the holding at ecosystem, species and genetic levels.

**B.17 In this agricultural holding, are there areas covered by natural or diverse vegetation? including one or a combination of the following:**

Reference year: Last calendar year

(Fill in all that apply, leave it blank if "None of the above")

- 1 Natural pasture or grasslands
- 2 Wildflower strips
- 3 Stone or wood heaps
- 4 Trees or hedgerows
- 5 Natural ponds or wetlands
- 6 None of the above

→ [Go to B.19](#)

This question is asked with reference to the last calendar year. Enumerators must list all options related to natural and diverse vegetation as reported below from code 1 to code 5. Once one or more of the natural or diverse vegetation options are filled in questions B.17, enumerators record the area of the holding which is not cultivated as it is covered by one or a combination of the above listed natural or diverse vegetation options in question B.17.

**Note: if the answer given is coded 6 (none of the above) enumerators go to question B.19 and skip next question B.18**

**Box 29: Definitions of key terms**

**Natural pasture or grasslands** (<http://www.fao.org/docrep/005/x7660e/x7660e0b.htm>): Natural pasture takes many forms, all of which have in common only that the herbage has not been sown. Most is grazed, but some is used for hay, which is made on sites as different as meadows, almost sheer clearings on hillsides, subtropical forest land closed for regeneration, alpine grassland, steppes, or a host of other uncultivated lands. In its narrow sense, “grassland” can be defined as ground covered by vegetation dominated by grasses, with little or no tree cover.

**Wildflower strips:** Can be defined as flower strips of a wild or uncultivated plant or the plant bearing it. They are known to attract and conserve a large diversity of insects, as they provide them food resources such as pollen and nectar, as well as shelter and overwintering sites.

**B.18 What is the total area of the holding covered by any of the natural or diverse vegetation identified above? (Please cross check with II.2)**

Reference year: Last calendar year

Total area covered

Area	Unit of measure

This question is asked with reference to the last calendar year. Enumerators record the area of the holding which is not cultivated because it is covered by natural or diverse vegetation identified in question B.17.

**It is important to the total area of the holding covered by natural or diverse vegetation MUST not be greater than the total area of the holding. Yet, this question must be filled if and only if it is reported the area of the holding whose land use type is “other” (code 10 in question II.2).**

**B.19 Are you using medically important antimicrobials as growth promoter for your livestock?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 I don't know

This Yes/No question collect information on the use of antimicrobials as growth promoter for livestock. The definition of antimicrobials is reported in the box below. Enumerators do not ask this question if the agricultural holding does not have any animal (farm carries out only crop activities).

### Box 30: Definition of key terms

**Antimicrobials:** The term “antibiotic growth promoter” is used to describe any medicine that destroys or inhibits bacteria and is administered at a low, sub therapeutic dose. The use of antibiotics for growth promotion has arisen with the intensification of livestock farming. Antimicrobials are products that kill microorganisms or keep them from multiplying (reproducing) or growing (<https://animalantibiotics.org/dig-deeper/industry-glossary/>). According to the National Office of Animal Health (NOAH, 2001), antibiotic growth promoters are used to “help growing animals digest their food more efficiently, get maximum benefit from it and allow them to develop into strong and healthy individuals”. Although the mechanism underpinning their action is unclear, it is believed that the antibiotics suppress sensitive populations of bacteria in the intestines (<http://www.fao.org/tempref/docrep/fao/007/y5159e/y5159e05.pdf>).

The use of antibiotics has become common in the livestock production around the world. The growth-promoting effects of antibiotics are undisputed, but the collateral and long-term effect are debatable.

### **B.20 What is the percentage of the agricultural area on which crop rotation or crop/pasture rotation involving at least two different crops/pastures of two different plant genus is practiced?**

Reference year: Last three calendar years

(Leave it blank if not practiced)

1 Percentage of agricultural area . . . . . 

Percentage Area				

This question is asked with reference to the last 3 calendar years and it records the percentage of agricultural area of the holding in which crop rotation and/or pasture rotation is practiced for at least two different crops/pastures of two different plant families is practiced.

It is important that enumerators only record the percentage of agricultural area in which at least two crops are rotating on the same land. A definition of crop rotation is given in the box below.

### Box 31: Definition of key terms

**Crop rotation:** The practice of growing different crops in succession over a given time span on the same land, predominantly to preserve the productive capacity of the soil. Crop rotation implies simply dividing the growing space into a number of distinct areas, identify the crops to grow and then keep plants of the same type together in one area. Every year the plants grown in each given area are changed, so that each group (with its own requirements, habits, pests and diseases) can have the advantage of new ground.

**Introduction to question B.21-B.22.** Questions from **B.21 and B.22** collects information on organic farming practices, i.e. it ascertains whether the farm is producing agricultural products which have been produced, in accordance with specific technical specifications (standards) and have been certified as “organic” by a certification body.

**B.21 Did the holding produce crops and/or livestock that are certified organic or undergoing the organic certification process during the reference period?**

- 1 No → Go to C.1  
 2 Yes

This yes/no question is asked with reference to the last calendar year and it aims at ascertaining whether the holding produced certified crop or livestock or its undergoing certification process. A definition of certified organic crops and livestock is provided in box 32. Codes are 1 for yes and 2 for no

**Box 32: How can certified organic crop/livestock be defined?**

According to the AGRIS manual (FAO, 2017, p.112) the definition of certified organic crops must be established at country level, following local regulations and practices.

In general, certified organic farming practices means that the farm is producing agricultural products which have been produced, stored, processed, handled and marketed in accordance with specific technical specifications (standards) and have been certified as “organic” by a certification body. Some bodies allow certification of a part of a farm as long as organic and non-organic products are not mixed, while others require whole-farm certification. Certification can be given through a third-party accredited certification body or authority, or through Participatory Guarantee Systems (PGSs). Third-party certification bodies are accredited to a particular market (that is, the certification ensures that the production systems meet the regulations applying to a particular market) and certification by a certification body enables producers to export products labelled as organic to that market (being certified does not allow access to all markets). A PGS is based on the active participation of stakeholders and only recognized within a single country. It thus provides certification of organic production only for local markets, and not for export (FAO, 2015, para. 8.6.16).

An FAO webpage on certified organic crop can be browsed at <http://www.fao.org/organicag/oa-faq/oa-faq2/en/>

**B.22 Answer the following questions about the holding's organic certification.**

- Report the holding's Organic Registration Number  
 Report the name of the certifying body


1. Report the holding's Organic Registration Number
2. Report the name of the certifying body

Data collectors record the holding's Organic Registration Number and the certification body that has certified organic farming practices adopted by the holding. Skip this question if **B.21 was 1**.

## Section C: Social Dimension of the Holding

This section collects information on the social dimensions of the holding. The data items collected in this section covers; decent work, food security and secure rights to land tenure.

**Introduction to question C.1-C.2.** Questions from C.1 to C.2 gather information about unskilled hired labor used on agricultural holdings.

### C.1 Did this agricultural holding hire any workers for carrying out simple and routine tasks?

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes  
 2 No

→ Go to C.3

This Yes/No question collect information on the employed unskilled workers. An explanation of unskilled workers is given in Box 33 below.

**Note: if the answer given is “no” (code 2) enumerators go to question C.3.**

If the respondent uses vague terms in defining unskilled workers, ask him/her the exact type of job he/she did most of the time.

#### Box 33: Defining unskilled occupations

Occupation refers to the kind of work that a person does or the kind of the work he/she did, when he/she was working for the first time. This question is to enquire specifically about the nature of the job he/she is doing most of the time in the last agricultural year. The elementary occupation group is defined by the International Standard Classification of Occupation ('08) of the International Labor Organization. Workers employed by the holding under this occupation group are unskilled laborers that perform basic task for the holding. Interviewers should try to be as comprehensive as possible and they should avoid using the terminology as per ISCO classification, which is “elementary occupation/unskilled workers”. More specifically, interviewer should not ask whether the agricultural holding hired any unskilled workers. Rather, they should ask if any workers performing simple and routine farming tasks, requiring the use of simple hand-held tools and very often considerable physical effort, were employed in the past 12 months prior to the date of the interview. Tasks performed by laborers in this sub-major group usually include: digging, shovelling, loading, unloading, stacking, raking, pitching; spreading manure or fertilizers; watering and weeding; picking fruit, vegetables and various plants; feeding animals; cleaning animal quarters and farm ground. Agricultural holding that hired unskilled workers must also report the number of workers who were hired during the last agricultural season.

### C.2 How much did this agricultural holding pay on average in cash and/or in-kind to a worker performing simple and routine tasks per day (of 8 hours)?

Reference year: Last calendar year

(Read all options and fill in all that apply)

- 1 Daily average wage in local currency units . . . . .  
 2 Daily average wage paid in-kind and converted in local currency units . . . . .

Daily average wage				

This question collects information on the **average daily** payment (wages/salary) paid to unskilled workers. Enumerators should also record information about allowances and gratuities, which include allowances and per diems paid to employees. In case the time unit for payment is not the day, enumerators must ask the respondent to estimate the amount of wage paid on a daily basis. For instance, if payment is weekly, monthly, annual, etc., respondent must convert the corresponding amount into a daily measure, by providing an estimate of wage paid to a given unskilled worker.

NOTE: Payment can also be provided in-kind which must be converted into a monetary value. In estimating in-kind payments, the respondent should estimate what he or she would have to paid for the labor if products through which the payment was made (in-kind) were purchased in the market.

**Introduction to question C.3-C.10.** The set of eight Yes/No questions collect information about the level of food security in the household. The questions on food security should be asked to the holder and his/her household members. In case the respondent of the survey is a manager of the holding or an employee, then this section should not be asked as it is unlikely that they will be informed about the situation of food security of the holder and his/her household members.

**It is important to notice that the reference period for questions C.3-C.10 is not the last calendar year but the last 12 months prior to the date of the interview. This implies that if the interview is conducted on September 1 2018, the last 12 months will be from September 1, 2017 to August 31, 2018.**

**Before asking question from C3 to C.10 make sure to only ask them to household farms. Enumerators skip questions from C.3 to C.10 and go to question C.11 if the sampled holding belongs to the Non-household sector. Yet, do not ask this question to respondent’s managers or employees (code 3 and 5 in question I.1.4)**

**C.3. During the last 12 months, was there a time when you (or any other member in the household) were worried that you would not have enough food to eat because of a lack of money or other resources?**

Reference year: Last 12 months

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 I don't know
- 4 I don't want to answer

This Yes/No question refers to a state of being worried, anxious, apprehensive, afraid or concerned that there might not be enough food or that food will run out (because there is not enough money or other resources to get food). The worry or anxiety is due to circumstances affecting their ability to procure food, such as: loss of employment or other source of income, or other reasons for not having enough money; insufficient food production for own consumption; insufficient food available for hunting and gathering; disrupted social relationships; loss of customary benefits or food assistance; environmental or political crises. It is not necessary for the respondent to have actually experienced not having enough food or running out of food to answer yes to this question.

**C.4. Still thinking about the last 12 months, was there a time when you (or any other member in the household) were unable to eat healthy and nutritious food because of a lack of money or other resources?**

Reference year: Last 12 months

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 I don't know
- 4 I don't want to answer

This Yes/No question asks the respondent whether s/he was not able to get foods they considered healthy or good for them, foods that make them healthy, or those that make a nutritious or balanced diet (because there was not enough money or other resources to get food).

The answer depends on the respondent's own opinion of what they consider to be healthy and nutritious foods. This question refers to the quality of the diet and not the quantity of foods eaten.

**C.5. Was there a time when you (or any other member in the household) ate only a few kinds of foods because of a lack of money or other resources?**

Reference year: Last 12 months

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 I don't know
- 4 I don't want to answer

The Yes/No question asks if the respondent was forced to eat a limited variety of foods, the same foods, or just a few kinds of foods every day because there was not enough money or other resources to get food. The implication is that the diversity of foods consumed would likely increase if the household had better access to food.

**Alternative phrases:**

- You ate meals with a limited variety of foods;
- You ate the same foods or just a few kinds of foods every day;
- You had to eat a limited variety of foods;
- You had to eat the same foods every day;
- You had to eat just a few kinds of foods.

This question refers to quality of the diet and not the quantity of foods eaten. It implies lack of money/resources rather than customary habits or other circumstances (i.e., health or religion) as the reason for limiting the variety of food.

**C.6. Was there a time when you (or any other member in the household) had to skip a meal because there was not enough money or other resources to get food?**

Reference year: Last 12 months

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 I don't know
- 4 I don't want to answer

This Yes/No question inquires about the experience of having to miss or skip a major meal (for example, breakfast, lunch or dinner depending on the norm for number and times of meals in the culture) that would normally have been eaten (because there was not enough money or other resources to get food.) This question refers to insufficient quantity of food.

**C.7. Still thinking about the last 12 months, was there a time when you (or any other member in the household) ate less than you thought you should because of a lack of money or other resources?**

Reference year: Last 12 months

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 I don't know
- 4 I don't want to answer

This Yes/No question inquires about eating less than what the respondent considered they should, even if they did not skip a meal (because the household did not have money or other resources to get food). The answer depends on the respondent's own opinion of how much they think they should be eating. This question refers to quantity of foods eaten and not the quality of the diet. This question does not refer to special diets to lose weight or for health or religious.

**C.8. Was there a time when you (or any of the other member in the household) ran out of food because of a lack of money or other resources?**

Reference year: Last 12 months

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 I don't know
- 4 I don't want to answer

This yes/no question refers to any experiences when there was actually no food in the household because they did not have money, other resources, or any other means to get food.

**C.9. Was there a time when you (or any of the other member in the household) were hungry but did not eat because there was not enough money or other resources for food?**

Reference year: Last 12 months

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 I don't know
- 4 I don't want to answer

This Yes/No question asks about the physical experience of feeling hungry, and specifically, feeling hungry and not being able to eat enough (because of a lack of money or resources to get enough food). It does not refer to special diets to lose weight or fasting for health or religious reasons.



**C.10. During the last 12 months, was there a time when the you (or any of the member in the household) went without eating for a whole day because of a lack of money or other resources?**

Reference year: Last 12 months

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 I don't know
- 4 I don't want to answer

This Yes/No question asks about a specific behaviour—not eating anything all day (because of a lack of money and other resources to get food). It does not refer to special diets to lose weight or fasting for health or religious reasons. Codes associated with this question are as follows:

- 1. Yes
- 2. No

**Box 34: Food Insecurity Experience Scale**

The items that compose the FIES module, ask people directly about having to compromise the quality and quantity of the food they eat due to limited money or other resources to obtain food. Each item refers to a different situation and is associated with a level of severity according to the theoretical construct of food insecurity underlying the scale. By asking the series of related questions that compose the FIES, it is possible to classify respondents at different levels of severity: “food secure” (those who answer “no” to all the questions about food insecurity-related experiences) or “food insecure” along a continuum of food insecurity severity, as shown below (see Ballard Terri J, Kepple Anne W. Cafiero C, FAO, 2013)

From Mild Food insecurity			... To Severe Food insecurity
Worrying about how to produce food	Compromising on quality and variety	Reducing quantities, skipping meals	Experiencing hunger

**Introduction to question C.11-C.14.** These questions collect information on how much land is owned by the holding and how it was obtained. These set of questions is crucial but sensitive, so interviewers should ask them carefully. It is sensitive because the head of the holding may think that the government has plans to confiscate his/her land or, alternatively, to compensate the holding they have only a small plot.

**C.11. Does the holder/holding have a formal document for any of the agricultural land that it holds (alternatively ‘possess, use, and occupy’) issued by the Land Registry/Cadastral Agency?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 Don't know
- 4 Refuses to respond

This question identifies whether there is a legally recognized document for any of the agricultural land that the respondent has declared to have, as well as the type of documentation held by the respondent for the

land owned. Documented ownership / tenure rights refer to the existence of any document an individual can use to claim ownership or tenure rights in law over the land.

Below is the list of formal documents issued by the Land Registry/ Cadastral Agency:

- 1 Title deed
- 2 Certificate of customary tenure
- 3 Certificate of occupancy  
Registered will or registered certificate of hereditary
- 4 acquisitions
- 5 Registered certificate of perpetual / long term lease
- 6 Registered rental contract

**C.12 Is the name of the holder or any other member of the holding is listed as an owner or use right holder on any of the legally recognized documents?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 Don't know
- 4 Refuses to respond

Because individual names can be listed as witnesses on a document, it is important to ask if the respondent is listed "as an owner" or "holder" on the document. It is recommended that the measure of documented ownership / tenure rights not be conditional on the respondent producing the document for the enumerator to confirm.

**C.13. Does the holder/holding have the rights to sell any of the parcel of the holding (alternatively 'parcel possessed, used or occupied')?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 Don't know
- 4 Refuses to respond

This question records information on whether the respondent believes that he/she has the right to sell any of the agricultural land s/he reports possessing. When a respondent has the right to sell the land, it means that he or she has the right to permanently transfer the land to another person or entity for cash or in kind benefits.

**C.14. Does the holder/holding have the rights to bequeath any of the parcel of the holding (alternatively 'parcel possessed, used or occupied')?**

Reference year: Last calendar year

(Fill in one circle only)

- 1 Yes
- 2 No
- 3 Don't know
- 4 Refuses to respond

This question obtains information on whether the respondent believes that he/she has the right to bequeath any of the agricultural land he/she reports possessing. When a respondent has the right to bequeath the land, it means that he/she has the right to give the land by oral or written will to another person(s) upon the death of the respondent.

**END OF SURVEY**

The enumerator thank the respondent and record the end time of the survey.

**End time of the survey:**       hour     minutes

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**Food and Agriculture  
Organization of the  
United Nations**

**SDG Indicator 2.4.1**

**PROPORTION OF AGRICULTURAL AREA  
UNDER PRODUCTIVE AND SUSTAINABLE AGRICULTURE**

**METHODOLOGICAL NOTE**

**Revision 10**

22 July 2020

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## 1. Introduction:

### Background on SDG indicators

In September 2015, the United Nations General Assembly adopted the 2030 Development Agenda and an associated 17 Sustainable Development Goals (SDGs). The resultant SDGs are accompanied by 169 targets under the various goals and a set of 232 indicators to monitor progress toward the SDGs. Responsibility for the development of indicators is given to the United Nations Statistical Commission (UNSC), which established an Inter-Agency and Expert Group on Sustainable Development Goals indicators (IAEG-SDG) comprising of 28 member countries.

While the international system of official statistics is embodied in the UNSC and member countries, in practice the measurement and international reporting of the comprehensive set of SDG topics is coordinated through a range of international agencies. These agencies, including the OECD, WHO, FAO, IMF, World Bank, ILO, have developed statistical and measurement expertise in the particular areas that fall within their broader roles. Under the auspices of the IAEG-SDG, various agencies were given “custodianship” for the finalization of the appropriate indicators for the different SDG targets and for the co-ordination of data collection following endorsement of the indicators, including leading the co-ordination with other international agencies. FAO was given custodianship of 21 indicators across six SDGs.

Among the large number of SDG indicators, some are based on currently established methods and data (Tier I); others have methods but data collection is more limited (Tier II); and finally there are indicators for which agreed definitions and methods need to be developed (Tier III). The indicator on productive and sustainable agriculture currently falls into the Tier II category.

### Target 2.4: Sustainable agriculture

This document focuses on the indicator for Target 2.4, one of eight targets under SDG 2: “End hunger; achieve food security and improved nutrition and promote sustainable agriculture”. Specifically, Target 2.4 is to “By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.”

## 2. Process for developing SDG indicator 2.4.1

Led by FAO and in collaboration with the Global Strategy to improve Agricultural and Rural Statistics (GSARS), work progressed through 2015-18 to establish a methodology to measure progress towards achieving Target 2.4. A two-page methodology note, endorsed by the IAEG-SDG in March 2016, described, in broad terms an approach to the measurement of this indicator of which the most challenging aspect is the definition of productive and sustainable agriculture.

Through 2016 research focused on a broad ranging literature review on “Frameworks and Methods for Measuring and Monitoring Sustainable Agriculture” (Hayati, 2017) conducted by the GSARS. A key aspect of all approaches to measuring sustainable agriculture is the recognition that sustainability is a multi-dimensional concept, which therefore need to be reflected in the construction of the indicator.

A technical meeting was convened in December 2016 involving a number of experts in sustainable agriculture to establish priority areas for measurement for indicator 2.4.1. The results were drawn together to complete a first draft of the methodological paper. That draft was presented to the February 2017 meeting of the Scientific Advisory Committee (SAC) of the GSARS.

Utilizing their feedback, an updated draft was completed to support discussion at an Expert Group Meeting (EGM) held in Rome from 3-5 April, 2017. The EGM gathered agricultural statisticians from



eight countries in all regions, civil society and private sector representatives, as well as thematic experts from academia and from FAO Technical Departments. The purpose of the EGM was to review the methodology developed and to provide guidance on the approach, the dimensions, themes and sub-indicators offered for discussion, as well as the modalities to construct Indicator 2.4.1.

A key aspect in the development of the method was the selection of relevant themes, sub-indicators and the sustainability criteria for each sub-indicator. Following the EGM, detailed descriptions of methods for sub-indicators across all three dimensions of sustainability – economic, environmental and social – were developed and the methodological document was further refined. On the basis of research and discussion, in particular involving engagement with thematic experts, a set of documents was developed to support desk testing of the indicator in selected countries.

In October 2017, the methodological documents were submitted to an online global consultation, inviting all National Offices in charge of agricultural statistics to provide their comments.

In November 2017, the methodology was submitted to the IAEG-SDG at its 6<sup>th</sup> Meeting in Bahrain. The recommendations of the IAEG-SDG were to wait for the results of the country pilots and re-submit the methodology after having taken their results into account. In addition, the IAEG-SDG provided a series of comments on the approach and methodology.

Pilot desk studies were carried out in Bangladesh, Ecuador, Kyrgyz Republic and Rwanda during the last quarter of 2017, and in Belgium in early 2018. The goal was to test the proposed approach and review the metadata sheets for the respective indicators to: 1) assess its clarity and completeness; 2) take stock of what data are available at a country level; and 3) verify whether the indicator can be constructed using the information already available at the country level. Results are presented in separate reports. In April 2018, participants from the five pilot countries gathered in a technical meeting at FAO to present the results of their desk studies and work out modifications to the methodological document with the team in charge of SDG 2.4.1 development. In 2018-19, cognitive tests of the standalone survey questionnaire developed for SDG 2.4.1 were carried out in Kenya, Mexico and Bangladesh. In collaboration with the Bangladesh Bureau of Statistics, a full scale pilot test to collect data on the survey questionnaire and calculate the indicator was completed in 2019.

Results from the global consultation, the IAEG-SDG, and the country pilots were reviewed and analyzed, and the approach was modified in order to address the issues identified through these processes, resulting in a first revision of the methodology document, dated 22 May 2018. This version was shared with the members of the IAEG-SDG, and two subsequent webinars were organized to present the methodology and discuss IAEG-SDG questions and comments. Member countries were then invited to provide their comments in writing. After taking into account the country comments, the revised methodology was submitted to the 8<sup>th</sup> meeting of the IAEG-SDG for tier upgrade in October 2018, where it was reclassified as Tier II.

Additional comments were received from countries during the period January to March 2019, aimed at further refining the Biodiversity sub-indicator as part of the 2020 Comprehensive Review of the Global Indicators Framework. In March 2019 an informal and voluntary country-led working group was established with Brazil, Canada, USA, Argentina, Chile, France and Russia as members and FAO as an observer. The group was tasked with identifying scientifically valid, universal and measurable alternative sustainability criteria for the Biodiversity sub-indicator. As a result of an iterative and consultative process, the group submitted a consolidated proposal to FAO for review in August 2019. After the consensus was reached on the final modifications in October 2019, FAO submitted the compromise consensus proposal to the IAEG-SDG, which endorsed it at its Oct 26-28 Meeting. This 07 November 2019 version represents the final endorsed version of the SDG 2.4.1 methodology.

In the next phase, FAO will be working with countries in the collection and reporting data on SDG 2.4.1, in order to support countries in producing it and using it for national policy analysis as well as for SDG reporting.

### 3. Methodology for constructing the indicator

Note: The following terminology has been used in this document:

- **Indicator:** Overall measure of sustainable agriculture.
- **Dimension:** The dimensions of sustainability: economic, environmental, social.
- **Themes:** Specific areas within a dimension (e.g. land productivity, biodiversity, decent employment, etc.)
- **Sub-indicator:** Variable used to measure performance of the farm in relation with a given theme.
- **Sustainability criteria:** Critical/thresholds values against which the performance of each sub-indicator is assessed to classify the farm in terms of the sustainability level.

#### Steps involved in constructing the indicator

The following steps were used to derive the indicator for sustainable agriculture. Although these steps are presented in a linear fashion, in practice, a degree of iteration was required through extensive discussion and research. This is especially the case for steps 3, 5 and 6 below in which the description of the relevant approach for assessing sustainability performance depends on the sub-indicator, but at the same time, the choice of sub-indicator is closely informed by the data collection instrument:

1. Determining the **scope** of the indicator: The scope of Indicator 2.4.1 is the agricultural farm holding, and more precisely the agricultural land area of the farm holding, i.e., land used primarily to grow crops and raise livestock. Forestry, fisheries and aquaculture activities may be included to the extent that they are secondary activities conducted on the agricultural area of the farm holding, for example rice-fish farming and similar systems.
2. Determining the **dimensions** to be covered: Indicator 2.4.1 includes environmental, economic and social dimensions in the sustainability assessment.
3. Choosing the **scale** for the sustainability assessment: Indicator 2.4.1 is farm level with aggregation to higher levels.
4. Selecting the data collection **instrument(s)**. It is recommended that indicator 2.4.1 be collected through a farm survey.
5. Selecting the **themes** within each dimension, and choosing a **sub-indicator** for each theme. The sub-indicators should satisfy a number of criteria (described in annex 1 for each sub-indicator).
6. Assessing **sustainability performance at farm level for each sub-indicator**: Specific sustainability **criteria** are applied in order to assess the sustainability level of the farm for each theme according to the respective sub-indicators.
7. Deciding the **periodicity of monitoring the indicator**. It is recommended to be collected at least every three years.
8. **Modality of reporting the indicator**. The set of sub-indicators are presented in the form of a **dashboard**. The dashboard approach offers a response in terms of measuring sustainability at farm level and aggregating it at national level.

#### Characteristics of Indicator 2.4.1

Indicator 2.4.1 is defined as “Proportion of agricultural area under productive and sustainable agriculture”, which is expressed by the following formula:

$$SDG2.4.1 = \frac{\text{Area under productive and sustainable agriculture}}{\text{Agricultural land area}}$$

This implies the need to measure both the extent of land under productive and sustainable agriculture (the numerator), as well as the extent of agricultural land area (the denominator). The numerator is the subject of this note, and its computation is described in the sections “Assessing sustainability performance for each sub-indicator” and “Reporting the indicator at national level”. The denominator,

in turn, is the sum of the agricultural land area (as defined by FAO) utilized by agricultural holdings that are owned (excluding rented-out), rented-in, leased, sharecropped or borrowed.

The methodological note further indicates that the construction of the indicator must respect the following conditions:

- The indicator must reflect the priorities as they are expressed in the SDG target 2.4. and therefore to consider issues related to resilience, productivity, ecosystem maintenance, adaptation to climate change and extreme events, and soils.
- The preferred data source is the farm survey.
- The need to define productive and sustainable agriculture implies the use of criteria to distinguish between sustainable and unsustainable areas.

#### Measurement scope: the focus is on agricultural production

The scope of Indicator 2.4.1 is the agricultural farm holding, and more precisely the agricultural land area of the farm holding, i.e., land used primarily to grow crops and raise livestock. This choice of scope is fully consistent with the intended use of a country's agricultural land area as the denominator of the aggregate indicator.

More precisely:

##### Included within scope

- Intensive and extensive crop and livestock production systems
- Subsistence agriculture
- State and common land when used exclusively and managed by the farm holding
- Food and non-food crops and livestock products (e.g. tobacco, cotton, sheep wool)
- Crops grown for fodder or for energy purposes
- Agro-forestry (trees on the agricultural land area of the farm)
- Aquaculture, to the extent that it takes place within the agricultural land area. For example, rice-fish farming and similar systems

##### Excluded from scope

- State and common land not used exclusively by the farm holding
- Nomadic pastoralism
- Production from gardens and backyards. Production from hobby farms<sup>1</sup>
- Holdings focusing exclusively on aquaculture
- Holdings focusing exclusively on forestry
- Food harvested from the wild

Beyond defining the measurement boundary for agricultural production, the following considerations are also to be noted:

First, from an environmental perspective, the scope of the indicator focuses on the environmental impacts of farming within the farm gate, i.e. the direct impacts that farming practices, farmer choices and farming methods have on the environment. For example, the decline in soil health or water pollution within the farm holding due to nutrient imbalance is within scope, but land-use change, specifically the conversion from natural vegetation to agricultural land, is not in scope.

From a social perspective, the approach focuses on farming as a source of livelihood. Thus, the social impact of farming activities in terms of household livelihood and food security is included. Access to

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<sup>1</sup> Countries will define hobby farms as per their national criteria and remove these farms from the population of interest for 2.4.1 until an international definition is available.

productive resources, including land, is considered, as it impacts directly the performances of agriculture, but access to basic services, for instance (water, education and health care) for farm households<sup>2</sup> is considered outside of the scope of the assessment.

In terms of food value chains, the scope being within the agriculture holding, the indicator does not extend to the sustainability of transportation, storage, processing, distribution and marketing of agricultural products. Rather, SDG 12 addresses the issue of sustainable consumption and production of food, and specific indicators exist to capture sustainability in the value chain.

Likewise, the proposed approach does not take into consideration the sustainability of supply chains that provide inputs to agricultural production. For example, the availability and cost of fertilizers will not be captured except to the extent that they affect farm profitability or soil health.

Finally, the impacts of food systems on the health of end-consumers and their dietary outcomes (except for the farm household itself) is outside the scope of the indicator.

### Spatial scope: the denominator

An important aspect is to determine the total agricultural land area of a country to be used as denominator for SDG 2.4.1. Agricultural land is defined by FAO as the sum of cropland (arable land plus permanent crops) and permanent meadows and pastures (FAOSTAT [Land Use, Irrigation and Agricultural Practices Questionnaire](#), 2018; SEEA AFF, 2018). National level statistics on agricultural land are collected by FAO from member countries and disseminated in FAOSTAT. Two practical points need to be considered:

- determining the extent to which the coverage and design of the farm survey encompasses the entire agricultural land area;
- determining the extent to which the total land area under the management of farmers (the agricultural farm holding) is different from the associated agricultural land areas. The agricultural holding may be larger than the agricultural land area because it can also include for example, areas left for conservation, farm buildings, etc.

For the purpose of calculating the indicator, the statistical unit is the farm holding to which an agricultural land area is associated. Sustainability for each sub-indicator is likewise assessed at the level of the agricultural land area of the farm holding.

Particular consideration must be given to common land that cannot be clearly associated with a particular farm holding. In some regions, these lands may represent a large percentage of agricultural land areas. This is relevant in many countries where a significant number of farmers, with or without land, rely on livestock farming using common lands (pastoralists, agro-pastoralists).

In line with the World Census of Agriculture, as well as consistently with the farm survey instruments selected to measure indicator 2.4.1 (next section), common land is included within scope insofar as it can be associated with and is under the exclusive control of a particular farm holding. Areas of land that are not managed but used by different farm holdings without any management arrangement are out of scope of indicator 2.4.1.

### Farm typology and scope

In some developed countries, farm surveys limit their coverage to farms with a value of operations above a certain monetary threshold in order to exclude hobby farmers. In developing countries, applying this threshold would tend to exclude smaller and subsistence farms whose contribution to total agricultural area and overall sustainability may be substantial. This methodology requires that all

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<sup>2</sup> The definitions of household and non-household sector are based on the World Census of Agriculture 2020 (<http://www.fao.org/3/a-i4913e.pdf>)

types of agricultural holdings be taken into consideration, with the exception of hobby farms, and considering the scope as described above.

### Data collection instrument

This methodology is based on the farm survey as main data collection instrument for all sub-indicators, but it also discusses the possibility of using a combination of different data sources as an alternative option for those countries wishing to do so.

By focusing on the farm holding and its agricultural land area, the farm survey offers an opportunity for collecting data through a single instrument for Indicator 2.4.1. This decision is in line with countries' efforts, supported by FAO, to develop farm surveys as the most appropriate tool for generating agricultural statistics.

The decision to focus on a farm survey has implications for the type of information that is possible to capture in order to cover the different dimensions of sustainability. While farm surveys are well suited to measure the economic dimension of sustainability, they may not be the ideal tool for measuring environmental and social sustainability in terms of impact/outcomes.

Typically, environmental impacts of agriculture are measured through monitoring systems like remote sensing, soil and water sampling, or other tools associated with a specific area, rather than within a single agricultural holding. For several environmental themes, it is unlikely that farmers would be able to assess the environmental impact of their farming practices on issues like fertilizer pollution or pesticide use. Using farm survey instead of environmental monitoring systems therefore implies moving from measuring outcome/impact to assessing farmers' behavior. Whenever possible, however, the revised methodology continues to focus on measuring outcomes.

The information in the social dimension themes is generally captured through household surveys. While in the majority of cases agricultural farm holdings are closely associated with a given household, this is not always the case, and therefore care must be given to capturing this information through dedicated survey design.

### Defining themes and sub-indicators

#### *Selecting themes*

The literature review (Hayati, 2017) identified a large number of potential sustainability themes across the three dimensions of sustainability and, for each theme, usually a large number of possible sub-indicators. The key considerations in the selection of themes are relevance and measurability. In terms of relevance, the relationship between the associated sub-indicator and sustainable agriculture outcomes at farm level should be strong. Following this approach, only sub-indicators that are responsive to farm level policies aimed at productive and sustainable agriculture are considered. In terms of measurability, only a "core" set of themes and sub-indicators, for which measurement and reporting is expected in the majority of countries, are selected.

Two points deserve to be mentioned. First, there are many relevant themes and sub-indicators but, from an operational point of view, it is unfeasible to consider all of them in order to measure progress towards productive and sustainable agriculture. The subject is too complex, and the factors influencing sustainable agriculture too diverse across countries, for reaching a consensus on an indicator that covered all sustainability issues while remaining manageable and universally valid. Measurement of indicator 2.4.1 is therefore operationalized through a core set of 11 themes for global reporting purposes. Countries may consider including **additional themes** to ensure that their national indicator for productive and sustainable agriculture is relevant for national policy-making, yet to ensure international coherence, they are requested to report globally on Indicator 2.4.1 by using the core set of 11 sub-indicators associated with the 11 themes.

Second, the selection of themes for this indicator must be seen in the context of other SDG indicators that cover the full range of economic, environmental and social themes associated with sustainable development. This is especially important when recalling that, for Indicator 2.4.1, the intention is to focus on a farm level assessment of sustainable agriculture, rather than provide information to support a more generalized discussion on the contribution of agricultural activity to various economic, environmental and social outcomes.

### *Criteria for selecting sub-indicators*

Selecting the most appropriate sub-indicator for each theme is a distinct step in the process. For any given theme, there may be multiple sub-indicators that are relevant and/or measurable. Consequently, in selecting the sub-indicators for indicator 2.4.1, the following six key criteria have been considered:

- **Policy relevance:** the indicator must be easily understood (reasons why it is selected) and the results easily interpreted by policy makers (is agricultural productivity and sustainability increased and why? Which policies need to be implemented to address the issue?).
- **Universality:** the indicator must be relevant for all countries in the world, both developing and developed.
- **International comparability:** the way indicators are computed must ensure comparability across countries in order to ensure global reporting. Comparability, however, does not necessarily mean the use of absolute standards. For instance, agricultural wages may be compared with the national minimum wage rate, even if these wage rates vary from one country to another. Similarly, compliance with national environmental standards or nationally recognized certification systems can be considered in computing environmental sub-indicators, even if national criteria vary from one country to another.
- **Measurability:** many themes are important productivity and sustainability issues but their measurement is difficult, complex or would involve costs that cannot be sustained in the framework of a regular monitoring exercise. To the extent possible, alternative measures have been proposed to maintain indicators that are considered relevant while offering feasible measurement solutions.
- **Cost effectiveness:** cost effectiveness is related to measurability. The cost associated with indicator measurement have systematically been considered in relation with the accuracy and reliability of the results obtained through different measurement options.
- **Minimum cross-correlation between sub-indicators:** The set of eleven themes and sub-indicators are meant to have low cross-correlation between them. High cross-correlation would imply that two or more sub-indicators capture the same sustainability issue. In this case, the inclusion of one single sub-indicator, instead of several, would be sufficient to adequately measure agricultural sustainability performances.

Sub-indicators may be of five broad types:

- **Impact/outcome** indicators that record what the state or change in state of environmental, economic and social factors and associated flows of benefits or costs.
- **Awareness** indicators record the level of awareness and knowledge of interviewed persons in relation with a given sustainability issue. Awareness is considered a prerequisite step towards addressing sustainability issues.
- **Behavior** indicators that capture peoples' attitudes in relation to a given sustainability issue. While behavior is influenced by awareness, the two can also be disconnected.
- **Practice** indicators that measure specific and codified agricultural methods applied on a farm.
- **Perception** indicators that record peoples' views about a specific issue.

For the purposes of SDG reporting and consistent application across countries, it is considered that impact/outcome indicators should be the preferred focus of measurement: if an outcome can be

measured, it is the most objective way to measure performance in relation to a given sustainability theme. In the absence of the possibility to measure outcomes, capturing farm behavior through carefully crafted questions can be considered sufficient proxies to assess sustainability performances.

In general however, measuring sustainability performance through farm practices presents several challenges. The impact of a given practice often varies from one place to another, and from one farm type to another, and what can be considered sustainable in one setting may not be suitable in another. Care should be taken, therefore, when proposing indicators on practices to ensure that they are universally relevant in relation with the sustainability issue they are meant to address.

Perception indicators should be used carefully and are not considered to be amenable to the measurement of many sustainability themes as they offer a level of subjectivity hardly acceptable in the computation of an indicator like indicator 2.4.1.

### *List of sub-indicators*

The list of selected themes and sub-indicators is provided in Table 1. In total 11 themes are included. The methodology for the compilation of the sub-indicators and for defining the associated sustainability criteria is described in detail in Annex 1. Annex 1 also lists the minimum set of data items needed to produce the relevant information for the sub-indicator. Moreover, questionnaire modules that contain the minimum set of questions needed to measure each sub-indicator at farm level have also been designed. These questions can be integrated into existing farm surveys for ensuring a comprehensive assessment of indicator 2.4.1.

*Table 1: Revised list of themes and sub-indicators (see definitions in Annex and supporting documents)*

No.	Theme	Sub-indicators
1	Land productivity	Farm output value per hectare
2	Profitability	Net farm income
3	Resilience	Risk mitigation mechanisms
4	Soil health	Prevalence of soil degradation
5	Water use	Variation in water availability
6	Fertilizer pollution risk	Management of fertilizers
7	Pesticide risk	Management of pesticides
8	Biodiversity	Use of agro-biodiversity-supportive practices
9	Decent employment	Wage rate in agriculture
10	Food security	Food insecurity experience scale (FIES)
11	Land tenure	Secure tenure rights to land

Whenever the farm survey focuses on understanding levels of awareness, farmers' behavior or, in some cases, practices or perception, the questions are crafted in a way to maintain their universal relevance, to the extent possible.

### Assessing productivity and sustainability performance through each sub-indicator

For each sub-indicator, criteria to assess sustainability levels are developed. The concept of sustainability implies an idea of continuous progress and improvement towards improved performance across all themes, which can therefore be individually more or less sustainable. In order to capture the concept of continuous progress towards sustainability, a 'traffic light' approach is proposed, in which three sustainability levels are considered for each sub-indicator:

- Green: desirable
- Yellow: acceptable
- Red: unsustainable.



While a certain level of subjectivity is unavoidable, this approach allows identification, for each theme, of conditions of critical unsustainability (red), conditions that can be considered 'ideal' (green) and, in between, intermediate conditions that are considered 'acceptable' but would need to be scrutinized in terms of possible improvements (yellow). This approach also acknowledges the trade-offs that exist between sustainability dimensions and themes, and the need to find an acceptable balance between them.

Each sub-indicator is assessed at the level of the agricultural farm holding. The sustainability level is then associated with the agricultural land area of the agricultural holding. All sub-indicators for a given agricultural farm holding refer to the same underlying agricultural land area.

**Progress towards productive and sustainable agriculture: managing trade-offs across sustainability objectives**

Achieving productive and sustainable agriculture is a progressive process of identifying and striking a balance between agriculture's social, economic and environmental objectives. This process reflects the evolution of society's knowledge, which has an impact on how sustainability goals and priorities are set in practices. Assessment of agricultural sustainability must therefore be seen as a dynamic process subject to periodic revisions. The traffic light approach helps defining the 'hard boundaries' of unsustainability for each theme, as well as desirable conditions, helping to assess trade-offs across the different sustainability themes. The criteria proposed in this methodology reflect current level of knowledge and broad consensus on sustainability conditions and practices for each sub-indicator. They should be revised periodically to reflect progressive changes in knowledge.

### Periodicity

SDG Indicator 2.4.1 measures progress towards more productive and sustainable agriculture. For many sub-indicators, it is likely that changes will be small from one year to another. It is therefore recommended that the survey be conducted every three years. Furthermore, the 3-year periodicity will enable countries to have three data points on the indicator before 2030, assuming that they begin reporting in the early 2020s.

### Sampling design

The farm survey's sampling design must respond to the need to capture the structure and the different typologies of agricultural farm holdings. In particular, it is important to develop a specific design for the holdings of the non-household sector (i.e. commercial farms, corporations, etc.). A probabilistic sampling is required to allow the assessment of estimations errors and the extrapolation of the statistics using appropriate sampling weights. Stratification is recommended to improve the precision of the estimations and to produce disaggregated statistics. Possible stratification variables include agricultural farm holding types (household and non-household), agricultural production systems (e.g., crop, livestock, mixed) and other key elements to be considered (e.g., irrigated/non irrigated cropland) and taking into account sub-national specificities. This will allow reporting the indicator at national and sub-national levels and estimating corresponding precisions.

### Reporting the indicator

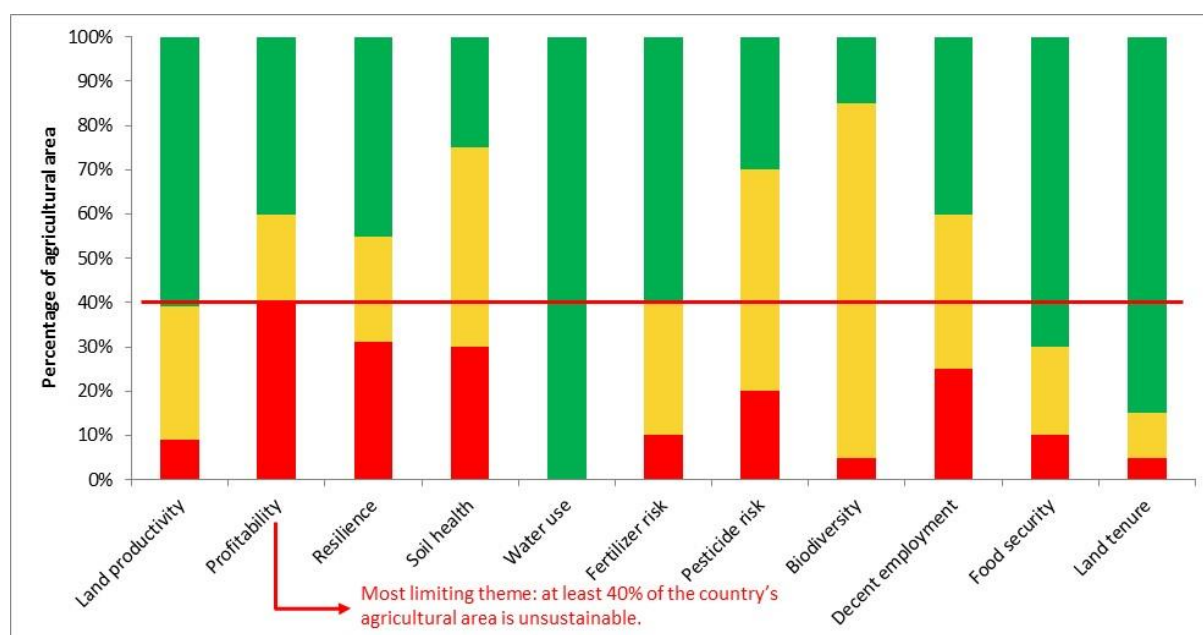
The final step in the sustainability assessment process is to report the results at sub-national and national level. In order to do so at a subnational level, the level of possible geographical disaggregation should be that of the sampling domains of the farm survey, to which the farm data can be extrapolated.



### Reporting through a dashboard

The 2.4.1 methodology proposes reporting of indicator 2.4.1 through a national-level dashboard, presenting the different sub-indicators together but independently. The dashboard approach offers several advantages, including the possibility of combining data from different sources and identification of critical sustainability issues, facilitating the search for a balance between the three sustainability dimensions. As a result, countries can easily visualize their performance in terms of the different sustainability dimensions and themes, and understand where policy efforts can be focused for future improvements.

Example of dashboard for SDG Indicator 2.4.1



Computation of results and construction of the dashboard are performed for each sub-indicator separately using the 'traffic light' approach already defined for each sub-indicator: aggregation at national level is performed for each sub-indicator independently, by summing the agricultural land area of each agricultural holdings by sustainability category (red, yellow or green), and reporting the resulting national total as percentage of the total national agricultural land area of all agricultural farm holdings in the country.

In practice, the reported value of Indicator 2.4.1 is determined by the results of most-limiting sub-indicator in terms of sustainability performance (see example above). It should be noted however that, while the national-level dashboard proposed offers an easy tool for reporting the indicator 2.4.1, implementable across a variety of data collection methods, it will systematically over-estimate the proportion of agricultural area under productive and sustainable agriculture, compared to a farm-level dashboard approach. The reason is that different holdings will likely be categorized as unsustainable across different sub-indicators, however this information is lost by aggregating individually at national level. The total area considered 'unsustainable' will therefore likely be higher in reality than by performing nationally-aggregated limiting factors.

### *Computing Indicator 2.4.1 from the dashboard*

The values for reporting indicator 2.4.1 can be calculated as follows:

$$SDG241_d = \min_{n:1-11} (SI_{d_n})$$

where:

SDG241<sub>d</sub> = proportion of agricultural land area that have achieved the 'desirable' level.

SI<sub>d\_n</sub> = proportion of sub-indicator n that is classified as 'desirable'

min refers to the minimum level of SI<sub>d\_n</sub> at national level across all 11 sub-indicators

SDG241<sub>d</sub> is the proportion of agricultural area for which all sub-indicators are green.

$$SDG241_{a+d} = \min_{n:1-11} (SI_d + SI_a)_n$$

where:

SDG241<sub>a+d</sub> = proportion of agricultural land area that have achieved at least the 'acceptable' level (estimated by excess, see note below)

SI<sub>d\_n</sub> = proportion of sub-indicator n that is classified as 'desirable'

SI<sub>a\_n</sub> = proportion of sub-indicator n that is classified as 'acceptable'

min refers to the minimum level of (SI<sub>d\_n</sub> + SI<sub>a\_n</sub>) at national level across all 11 sub-indicators

SDG241<sub>a+d</sub> is the proportion of agricultural area for which all indicators are either green or yellow, an acceptable situation, but that could be improved.

$$SDG241_u = 1 - SDG241_{a+d} = \max_{n:1-11} (SI_{u_n})$$

where:

SDG241<sub>u</sub> = proportion estimated by default of agricultural area that is 'unsustainable' (see note below)

SI<sub>u\_n</sub> = proportion of sub-indicator n that is classified as 'unsustainable'

max refers to the highest value of SI<sub>u\_n</sub> across all 11 sub-indicators at national level

SDG241<sub>u</sub> is the proportion of agricultural area for which at least one sub-indicator is unsustainable, and is therefore classified as unsustainable.

The performances of countries over time can be measured by the change in the value of SDG241<sub>d</sub> and SDG241<sub>a+d</sub>. An increase over time indicates improvement, while decrease indicates degradation.

### Use of alternative data sources to construct the indicator

Several countries have suggested using existing or alternative data sources, such as remote sensing and Geographic Information System (GIS), on the grounds that these instruments can be more cost-effective and sometimes provide more reliable results than farm surveys. The table below indicates possible instruments/sources of information for each sub-indicator.

*Table 2: Possible data collection instruments for each sub-indicator*

No.	Sub-indicators	Possible data collection instruments
1	Farm output value per hectare	Agricultural surveys, household surveys linked with administrative records and market surveys, remote sensing, agricultural and livestock census
2	Net farm income	Agricultural surveys, household surveys linked with administrative records and market surveys, agricultural and livestock census
3	Risk mitigation mechanisms	Household surveys with agricultural information, community surveys, administrative records
4	Prevalence of soil degradation	Environmental monitoring systems, soil sampling, remote sensing calibrated with ground observations, GIS data/maps/models calibrated with ground observations and samplings
5	Variation in water availability	River flows records, water level records, abstraction records, remote sensing, GIS information/maps/hydrogeological models, administrative sources, household surveys
6	Management of fertilizers	Environmental monitoring systems (soil, water quality), agricultural surveys, GIS data/maps and models based on sale data, agricultural surveys and administrative sources
7	Management of pesticides	Environmental monitoring systems (soil, water quality), agricultural surveys, models based on active substance sale data, agricultural surveys and administrative sources
8	Use of agro-biodiversity-supportive practices	Environmental monitoring systems including remote sensing (land use/land cover), GIS data/maps
9	Wage rate in agriculture	Labor force survey, Household survey with agricultural module, administrative data
10	Food Insecurity Experience Scale (FIES)	Household surveys, health data
11	Secure tenure rights to land	Household surveys with agricultural module, administrative/legal sources

The use of such instruments can be considered, but several aspects need to be carefully taken into account prior to using alternative data sources. First of all, it should be demonstrated that the alternative source gives results of at least same quality as the surveys and ensure international comparability. In order to produce consistent and reliable data as per recommended periodicity, it is advised that the use of alternative data sources may be considered when the available datasets fulfill the following criteria:

- Can be reflected in or attributed to agricultural land area in the country, considering different farm typologies and agricultural regions;
- Can be associated with the country's agricultural productions systems, particularly crops, livestock and the combinations in between;
- Capture the same aspect/phenomenon as the proposed farm survey (as described in the sub-indicator metadata sheets) with at least a documented same quality, considering scientific standards;
- Are representative of the situation at the national level (with respect to agricultural land area) taking into account main agricultural region types;
- Are compliant with international/national standards and classifications systems in order to ensure the indicator to be internationally comparable;
- Data are available at the same level of territorial disaggregation as the farm survey.

- The ways and means to adjust for under-coverage and non-coverage (when needed) should be clearly devised and described;
- Data collection year and periodicity are homogenous across the sub-indicators.

Finally, using different data sources implies that mechanisms should in place at the country level to coordinate regularly the flow of required information generated by various institutions.

Alternative data sources may also be used to complement and/or validate farm survey data. This combined approach has the potential to improve the validity and soundness of results, in particular in countries that have well-established monitoring systems and that are able to produce quality information consistently over time. The information from other sources may be used and leveraged in different ways depending on quality and regularity of its collation. For example:

- Replace farm survey questions, when alternative sources of information are available and respond to the criteria listed above.
- Complement farm survey questions, by providing additional contextual information helpful to interpret the results.
- Crosscheck the farm survey results to identify any inconsistencies and ensure the robustness of the indicator. This validation exercise can be done ex-post or during the data collection by providing the external data to the enumerators before going to the field. In this way, the enumerators can probe whether the responses to the farm survey are consistent with the a priori external knowledge.

Therefore it is recommended that countries complement the farm survey with a monitoring system that can measure the impact of agriculture on the environment (soil, water, fertilizer and pesticide pollution, biodiversity) and on health (pesticides residues in food and human bodies). This will provide additional information and help crosschecking the robustness of indicator 2.4.1 with regard to the environmental dimension of sustainability.

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## Annex: Themes, sub-indicators and metadata sheets

### List of themes and related sub-indicators

No.	Theme	Sub-indicator
1	Land productivity	Farm output value per hectare
2	Profitability	Net farm income
3	Resilience	Risk mitigation mechanisms
4	Soil health	Prevalence of soil degradation
5	Water use	Variation in water availability
6	Fertilizer pollution risk	Management of fertilizers
7	Pesticide risk	Management of pesticides
8	Biodiversity	Use of agro-biodiversity-supportive practices
9	Decent employment	Wage rate in agriculture
10	Food security	Food Insecurity Experience Scale (FIES)
11	Land tenure	Secure tenure rights to land

## 1. Farm output value per hectare

**Dimension:** Economic

**Theme:** Land Productivity

Land productivity is a measure of agricultural value of outputs obtained on a given area of land. Maintaining or improving the output over time relative to the area of land used is an important aspect in sustainability for a range of reasons. At farm level, land productivity reflects technology and production processes for given agro-ecological conditions. In a broader sense, an increase in the level of land productivity enables higher production while reducing pressure on increasingly scarce land resources, commonly linked to deforestation and associated losses of ecosystem services and biodiversity.

**Coverage:** All farm types

### **Description:**

The sub-indicator is described as farm output value per hectare (crop and livestock).

Information on farm outputs and agricultural area should be standard information available from farm surveys thus providing a good basis for assessment at farm level.

- Farm output value: The volume of agricultural output at farm level generally takes into account production of multiple outputs, e.g. crop types and crop and livestock combinations, etc. Since the volume of agricultural outputs is not measured in commensurate units (e.g. not all outputs are measured in tonnes, and tonnes of different output represent different products), it is necessary to establish an appropriate means of aggregation, in this case using a monetary unit. A simple way to enable aggregation is to reflect the multiple outputs produced by a single farm in terms of values (i.e. quantity multiplied by prices).
- Farm agricultural land area: defined as the area of land used for agriculture within the farm<sup>3</sup>.

### **Sustainability criteria:**

Distance from the 90<sup>th</sup> percentile of the national distribution<sup>4</sup>:

- Green (desirable): Sub-indicator value is  $\geq 2/3$  of the corresponding 90<sup>th</sup> percentile
- Yellow (acceptable): Sub-indicator value is  $\geq 1/3$  and  $< 2/3$  of the corresponding 90<sup>th</sup> percentile
- Red (unsustainable): Sub-indicator value is  $< 1/3$  of the corresponding 90<sup>th</sup> percentile

### **Data items**

Reference period: last calendar year

1.1. Quantities of 5 major crops and/or 5 major livestock and its products and by-products produced by the farm holding (both for market and/or self-consumption)

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<sup>3</sup> According to the SEEA-AFF classification and the classification of the World Agricultural Census 2020

<sup>4</sup> It is recommended that the 90<sup>th</sup> percentile and the corresponding 1/3 and 2/3 thresholds are calculated by major types of production system (i.e. by crops, livestock, or mix of crops and livestock; household and non-household sector; and irrigated and non-irrigated farm holdings) and by major agricultural areas of the country. This is to compare the farm holding's productivity with similar farms in same agricultural area.

- 1.2. Farm gate prices of the above quantities produced
- 1.3. Quantities of other on-farm secondary activities carried out and/or commodities produced on the farm holding e.g. aquaculture, agroforestry and others
- 1.4. Farm gate prices of other on-farm activities/commodities
- 1.5. Agricultural land area of the holding



## 2. Net Farm Income

**Dimension:** Economic

**Theme:** Profitability

An important part of sustainability in agriculture is the economic viability of the farm, driven to a large extent by its profitability. Profitability is measured using the net income that the farmer is able to gain from farming operations. Availability and use of information on farm economic performance, measured using profitability, will support better decision making both at micro and macro-economic level. Since performance measures drive behaviour, better information on performance can alter behaviour and decision-making by government and producers both in large-scale commercial farming and medium and small-scale subsistence agriculture.

**Coverage:** All farms types

**Description:**

The sub-indicator measures if the farm is consistently profitable over a 3-year period. The focus of this sub-indicator is on income from farming operations as distinct from the total income of the farming household, which may include other sources of income such as, for example, employment in local businesses by other family members, tourism activity, etc.

Formula<sup>5</sup>:

$$NFI = CR + Y_k - OE - Dep + VIC$$

where:

- NFI = Total Net Farm Income
- CR = Total farm cash receipts including direct program payments
- $Y_k$  = Income in kind
- OE = Total operating expenses after rebates (including costs of labour)
- Dep = Depreciation
- VIC = Value of inventory change

Definitions:

- Net farm income refers to the return (both monetary and non-monetary) to farm operators for their labor, management and capital, after all production expenses have been paid (that is, gross farm income minus production expenses). It includes net income from farm production, the value of commodities consumed on the farm, depreciation, and inventory changes.
- Gross farm income refers to the monetary and non-monetary income received by farm. Its main components include cash receipts from the sale of farm products, direct program payments to producers, other farm income (such as income from custom work), value of food and fuel produced and consumed on the same farm, and change in value of year-end inventories of crops and livestock<sup>6</sup>.
- Farm cash receipts include revenues from the sale of agricultural commodities in local currency units that include sales of crops, livestock and its by-products.
- Direct program payments to producers included in farm cash receipts represent the amounts paid under various government and private programs to individuals involved in agricultural production. The payments related to current agricultural production include subsidies to encourage production or to compensate producers for low market returns, payments to stabilize incomes

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<sup>5</sup> The formula and definitions given above have been adopted from Statistics Canada: see <http://www.statcan.gc.ca/pub/21-010-x/21-010-x2014001-eng.pdf>

<sup>6</sup> Rental value of farm dwellings is not considered as part of farm income.

and payments to compensate producers for crop or livestock losses caused by extreme climatic conditions, disease or other reasons and insurance payments.

- Income-in-kind measures the value of the agricultural goods produced on farms and consumed by farm operator families. It is included to measure total farm production.
- Operating expenses represent business costs incurred by farm businesses for goods and services used in the production process. Expenses include both purchase and self-produced items that are: property taxes, custom work, seeds, rent, fertilizer and lime, chemicals, machinery and building repairs, irrigation, fuel for heating and machines, wages, interest and business share of insurance premiums.
- Depreciation charges account for the economic depreciation or for the loss in fair market value of the capital assets of the farm business. Calculated on farm buildings, farm machinery, and the farm business share of autos, trucks and the farm home, depreciation is generally considered to be the result of aging, wear and tear, and obsolescence. It represents a decrease in the potential economic benefits that can be generated by the capital asset.
- Value of inventory change (VIC) measures the currency value of the physical change in producer-owned inventories. This concept is used to value total agricultural economic production. To calculate VIC, the change in producer-owned inventories (between the end and the beginning of a calendar year) is first derived and then multiplied by the average annual crop prices or value per animal. This calculation is different from the financial or accounting book value approach, which values the beginning and ending stocks, and then derives the change.
- The VIC over all the major commodities can vary widely (depending on the size of the change of inventories and prices). The VIC can be either positive (when inventories are larger at the end of the year compared to the beginning levels) or negative (when year-end inventories are smaller than the levels at the beginning of the year). If the inventory levels are the same at the beginning and end of the year, VIC will be zero despite price changes.

Estimating profitability at a farm level will generally require compilation of basic farm financial records, i.e. daily, weekly, monthly or seasonal transactions in an organized way. In general, large commercial farms maintain detailed financial records however, in case of medium farms and small subsistence agriculture, record keeping is seldom practiced and in most of the countries it doesn't exist at all.

In case when detailed data are not available at farm level, then estimates will be calculated based on farmer declaration of both outputs and inputs quantities and prices. In these cases, depreciation, variation of stocks and taxes may be neglected. This is described below as simplified option (1).

A simplified option (2) is also offered, based on farmer's declaration of the agricultural holding's profitability over the last three calendar years. It is recommended to use this simplified option only when other two options are not feasible.

### **Sustainability criteria:**

For a farm to be profitable the net farm income should be above zero.

- **Green (desirable):** NFI is above zero for past 3 consecutive years
- **Yellow (acceptable):** NFI is above zero for at least 1 of the past 3 consecutive years
- **Red (unsustainable):** below zero for all of the past 3 consecutive years

### **Data items**

Reference period: last three calendar years

**Recommended option**

Data from farm financial records, i.e. daily, weekly, monthly or seasonal transactions in an organized way (in general, large commercial farms maintain detailed financial records on the basis of which the NFI can be calculated as per above equation).

**Simplified option (1)**

To be used when the detailed data are not available at farm level (better adapted to smallholders and household sector).

- 2.1 Quantities of 5 major crops and 5 major livestock and its products and by-products produced by the farm holding (both for market and/or self-consumption)
- 2.2 Farm gate prices of the above quantities produced
- 2.3 Operating expenses including inputs quantities and their market prices that were used to produce crops and livestock
- 2.4 Quantities of other on-farm secondary activities carried out and/or commodities produced on the farm holding e.g. aquaculture, agroforestry and others
- 2.5 Farm gate prices of other on-farm activities/commodities
- 2.6 Input quantities and prices that are used to produce other on-farm outputs
- 2.7 Agricultural land area of the farm holding

**Simplified option (2)**

- 2.1 Respondent's declaration on agricultural holding's profitability over the last 3 calendar years
- 2.2 Agricultural land area of the farm holding

### 3. Risk mitigation mechanisms

**Dimension:** Economic

**Theme:** Resilience

Resilience encompass absorptive, anticipatory and adaptive capacities and refers to the properties of a system that allows farms to deal with shocks and stresses, to persist and to continue to be well-functioning (in the sense of providing stability, predictable rules, security and other benefits to its members).

**Coverage:** All farms types

**Description:**

This sub-indicator measures the incidence of the following mitigation mechanisms:

- Access to or availed credit<sup>7</sup>.
- Access to or availed insurance.
- On farm diversification (share of a single agricultural commodity not greater than 66% in the total value of production of the holding).

Access to credit and/or insurance is defined here as when a given service is available and the holder has enough means to obtain the service (required documents, collateral, positive credit history, etc.). Broadly, access to one or more the above 3 factors will allow the farm to prevent, resist, adapt and recover from external shocks such as, floods, droughts, market failure (e.g. price shock), climate shock and pest/animal diseases.

**Sustainability criteria:**

A farm holding is considered resilient if it has availed or has the means to access the risk mitigation mechanisms as follows:

- **Green (desirable):** Access to or availed at least two of the above-listed mitigation mechanisms.
- **Yellow (acceptable):** Access to or availed at least one of the above-listed mitigation mechanisms.
- **Red (unsustainable):** No access to the listed mitigation mechanisms.

**Data items**

Reference period: last calendar year

- 3.1. Agricultural holding access to or availed of credit, insurance or other financial instruments:
  - Credit (formal, informal)
  - Insurance
- 3.2 List of other on-farm activities apart from crops and livestock
- 3.3 Value of output for the listed on-farm activities/commodities
- 3.4 Agricultural land area of the farm holding

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<sup>7</sup> Include cash loans and in-kind loans (e.g. seeds provided by another farmer and repaid with a share of the harvest, seeds, etc.) only for agriculture related investments.

## 4. Prevalence of soil degradation

**Dimension:** Environmental

**Theme:** Soil health

Many of the processes affecting soil health are driven by agricultural practices. FAO and the Intergovernmental Technical Panel on Soils (ITPS) have identified 10 main threats to soil functions: soil erosion; soil organic carbon losses; nutrient imbalance; acidification; contamination; waterlogging; compaction; soil sealing; salinization and loss of soil biodiversity.

**Coverage:** All farms types

### **Description:**

The sub-indicator measures the extent to which agriculture activities affects soil health and therefore represents a sustainability issue. A review of the 10 threats to soil shows that all except one (soil sealing, which is the loss of natural soil to construction/urbanisation) are potentially and primarily affected by inappropriate agricultural practices. Ideally, therefore, all soils under agricultural land area in a country should be the subject of periodic monitoring in order to assess the impact of agriculture on soils. This requires detailed surveys and sampling campaigns, associated with laboratory testing. In order to propose a manageable solution while capturing the main trends in the country in terms of soil health, the farm survey focuses on the four threats that combine the characteristics more widespread (for national monitoring, countries may choose to add any of the other areas indicated above, depending on relevance), and easier to assess through farm surveys:

1. Soil erosion
2. Reduction in soil fertility
3. Salinization of irrigated land
4. Waterlogging
5. Other - specify

The farm survey captures farmer's knowledge about the situation of the agricultural holding in terms of soil degradation. Experience has shown that farmers are very much aware of the state of their soils, health and degradation level. Farmers may also be offered the opportunity to mention other threats than the above four.

Other data sources on soil health may either complement the information collected through the farm survey and offer opportunities for cross-checking farmers' responses; or be used as alternative sources of data. Prior to the farm survey, a desk study could collect all available information on soil health, including using national official statistics or statistics available from international agencies such as FAO. This typically includes maps, models, results from soil sampling, laboratory analysis and field surveys, and all existing report on soil and land degradation at national level. On the basis of this information, maps or tables (by administrative boundaries or other divisions of the country) can be established, showing the threats to soils according to the above 4 categories of threats.

### **Sustainability criteria:**

Proportion of agricultural area of the farm affected by soil degradation.

- **Green (desirable):** The combined area affected by any of the four selected threats to soil health is negligible (less than 10% of the total agriculture area of the farm).
- **Yellow (acceptable):** The combined area affected by any of the four selected threats to soil health is between 10% and 50% of the total agriculture area of the farm.
- **Red (unsustainable):** The combined area affected by any of the four selected threats to soil health is above 50% of the total agriculture area of the farm.

**Data items**

Reference period: last three calendar years

- 4.1 List of soil degradation threats experienced on the holding
- Soil erosion (loss of topsoil through wind or water erosion)
  - Reduction in soil fertility<sup>8</sup>
  - Salinization of irrigated land
  - Waterlogging
  - Other (Specify)
  - None of the above
- 4.2 Total area of the holding affected by threats related to soil degradation
- 4.3 Agricultural land area of the farm holding

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<sup>8</sup> Reduction in soil fertility will be experienced by farmers as progressive reduction in yield and will be the result of a negative nutrient balance by which the amount of nutrient application (including through mineral and organic fertilizers, legumes, or green manure) is lower than the amount that is lost and exported by crops.

## 5. Variation in water availability

Dimension: Environmental

Theme: Water use

Agriculture, more specifically irrigated agriculture, is by far the main economic sector using freshwater resources. In many places, water withdrawal from rivers and groundwater aquifers is beyond what can be considered environmentally sustainable. This affects both rivers and underground aquifers. Sustainable agriculture therefore requires that that level of use of freshwater for irrigation remains within acceptable boundaries. While there is no internationally agreed standards of water use sustainability, signals associated with unsustainable use of water typically include progressive reduction in the level of groundwater, drying out of springs and rivers, increased conflicts among water users.

**Coverage:** All farm types

### **Description:**

The sub-indicator captures the extent to which agriculture contributes to unsustainable patterns of water use. Ideally, the level of sustainability in water use is measured at the scale of the river basin or groundwater aquifer, as it is the combined effect of all users sharing the same resource that impact water sustainability. The farm survey captures farmers' awareness and behaviour in relation with water scarcity, and associates them with three levels of sustainability. These awareness and behaviour are expressed in terms of:

- whether the farmer uses water to irrigate crops on at least 10% of the agriculture area of the farm and why, if the answer is negative (does not need, cannot afford);
- whether the farmer is aware about issues of water availability in the area of the farm and notices a reduction in water availability over time;
- whether there are organizations (water users organisations, others) in charge of allocating water among users and the extent to which these organisations are working effectively.

Other data sources may either complement the farm survey on water use and offer opportunities for cross-checking farmers' responses; or be used as alternative sources of data. Prior to the farm survey, a desk study should collect all available information on water balance, including national official statistics or statistics available from international agencies such as FAO. Information on water resources and use is usually collected by the entities in charge of water management or monitoring and are organised by hydrological entity (river basin or groundwater aquifer). They typically include hydrological records (river flow, groundwater levels), models and maps showing the extent of water use by hydrological entity.

### **Sustainability criteria:**

Farm sustainability in relation with water use will be assessed as follows:

- **Green (desirable):** Water availability remains stable over the years, for farms irrigating crops on more than 10% of the agriculture area of the farm. Default result for farms irrigating less than 10% of their agricultural area
- **Yellow (acceptable):** uses water to irrigate crops on at least 10% of the agriculture area of the farm, does not know whether water availability remains stable over the years, or experiences reduction on water availability over the years, but there is an organisation that effectively allocates water among users.
- **Red (unsustainable):** in all other cases.

**Data items**

Reference period: last three calendar years

- 5.1 Irrigated agricultural area of the holding
- 5.2 Reduction in water availability experienced on the holding
- 5.3 Existence of organizations dealing with water allocation
- 5.4 Agricultural land area of the farm holding



## 6. Management of fertilizers

**Dimension:** Environmental

**Theme:** Fertilizer pollution risk

Agriculture can affect the quality of the environment through excessive use or inadequate management of fertilizers. Sustainable agriculture implies that the level of chemicals in soil and water bodies remains within acceptable thresholds. Integrated plant nutrient management considers all sources of nutrients (mineral and organic) and their management in order to obtain best nutrient balance. Measuring soil and water quality captures the extent and causes of pollution, but establishing monitoring systems of soil and water is costly and not always feasible in countries.

Note: the management of plant nutrients addresses two sustainability issues: avoiding pollution, and maintaining a good level of soil fertility. This sub-indicator addresses the first issue, while the second one is addressed under sub-indicator 4 'Soil health'.

**Coverage:** All farm types

### **Description:**

The proposed approach is based on questions to farmers about their use of fertilizer, in particular mineral or synthetic fertilizers and animal manure, their awareness about the environmental risks associated with fertilizer and manure applications, and their behaviour in terms of plant nutrient management<sup>9</sup>. Management measures considered to help reducing risk is as follows:

1. Follow protocols as per extension service or retail outlet directions or local regulations, not exceeding recommended doses
2. Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers
3. Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs
4. Distribute synthetic or mineral fertilizer application over the growing period
5. Consider soil type and climate<sup>10</sup> in deciding fertilizer application doses and frequencies
6. Use soil sampling at least every 5 years to perform nutrient budget calculations
7. Perform site-specific nutrient management or precision farming<sup>11</sup>
8. Use buffer strips along water courses.

### **Sustainability criteria:**

Farm sustainability in relation with fertilizer pollution risk will be assessed as follows:

- **Green (desirable):** The farm takes specific measures to mitigate environmental risks (at least four from the list above). Default result for farms not using fertilizers<sup>12</sup>.
- **Yellow (acceptable):** the farm uses fertilizers and takes at least two measures from the above list to mitigate environmental risks
- **Red (unsustainable):** farmer uses fertilizer and does not take any of the above specific measures to mitigate environmental risks associated with their use.

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<sup>9</sup> In order to keep the questionnaire manageable, the module does not consider different types of crops or practices. The method therefore assumes that if a farmer reports best practices, these practices are applied over the entire farm. It may therefore over-estimate the area under good practices.

<sup>10</sup> Soil type, combined with climate, and in particular the frequency and intensity of rainfall events, are important elements to consider in deciding fertilizer application doses and frequencies.

<sup>11</sup> Precision farming is a farming management concept based on observing, measuring and responding to inter and intra-field variability in crops.

<sup>12</sup> Fertilizers to be considered include mineral and synthetic fertilizers as well as animal manure.

## Data items

Reference period: last calendar year

- 6.1 Use of synthetic or mineral fertilizer or animal manure/slurry by the agricultural holding (Y/N)
- 6.2 Specific measures taken to mitigate the environmental risks associated with the excessive use or misuse use of fertilizers as per list below:
- 1 Follow protocols as per extension service or retail outlet directions or local regulations, not exceeding recommended doses
  - 2 Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers
  - 3 Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs
  - 4 Distribute synthetic or mineral fertilizer application over the growing period
  - 5 Consider soil type and climate in deciding fertilizer application doses and frequencies
  - 6 Use soil sampling at least every 5 years to perform nutrient budget calculations
  - 7 Perform site-specific nutrient management or precision farming
  - 8 Use buffer strips along water courses.
- 6.3 Agricultural land area of the farm holding

## 7. Management of pesticides

**Dimension:** Environmental

**Theme:** Pesticide risk

Pesticides are important inputs in modern agriculture (crop and livestock), but if not well managed they can cause harm to people's health or to the environment. Practices associated with integrated pest management (IPM<sup>13</sup>) exist that contribute to minimise risks associated with the use of pesticides and limit their impact on human health and on the environment. The International Code of Conduct on Pesticide Management defines best practice in pesticide management.

**Coverage:** All farm types

**Description:**

The proposed sub-indicator is based on information on the use of pesticides on the farms, the type of pesticide used and the type of measure(s) taken to mitigate the associated risks<sup>14</sup>. It considers the possibility that the holding adopts specific measures to help reducing risks associated with pesticide use. List of possible measures:

Health

1. Adherence to label directions for pesticide use (including use of protection equipment while applying pesticides)
2. Maintenance and cleansing of protection equipment after use
3. Safe disposal of waste (cartons, bottles and bags)

Environment

1. Adherence to label directions for pesticide application
2. Adopt any of the above good agricultural practices (GAPs): adjust planting time, apply crop spacing, crop rotation, mixed cropping or inter-cropping
3. Perform biological pest control or use biopesticides
4. Adopt pasture rotation to suppress livestock pest population
5. Systematic removal of plant parts attacked by pests
6. Maintenance and cleansing of spray equipment after use
7. Use one pesticide no more than two times or in mixture in a season to avoid pesticide resistance.

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<sup>13</sup> Integrated Pest Management (IPM) is an ecosystem approach to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides (FAO).

<sup>14</sup> In order to keep the questionnaire manageable, the module does not consider different types of crop or livestock. Thus, the best practices could concern only one crop or livestock, while practices may be different for other ones. The method therefore assumes that if a farmer reports best practices, these practices are applied over the entire farm. It may therefore over-estimate the area under good practices.

## Sustainability criteria:

Farm sustainability in relation with pesticides will be assessed as follows:

- **Green (desirable):** The farm uses only moderately or slightly hazardous<sup>15</sup> pesticides (WHO Class II or III). In this case, it adheres to all three health-related measures and at least four of the environment-related measures. Default result for farms not using pesticides.
- **Yellow (acceptable):** The farm uses only moderately or slightly hazardous pesticides (WHO Class II or III) and takes some measures to mitigate environmental and health risks (at least two from each of the lists above)
- **Red (unsustainable):** The farm uses highly or extremely hazardous pesticides (WHO Class Ia or Ib), illegal pesticides<sup>16</sup>, or uses moderately or slightly hazardous pesticides without taking specific measures to mitigate environmental or health risks associated with their use (fewer than two from any of the two lists above).

## Data items

Reference period: last calendar year

- 7.1 Use of pesticides for crop or livestock by the agricultural holding (Y/N)
- 7.2 Use of highly or extremely hazardous or illegal pesticides by the agricultural holding (Y/N)
- 7.3 Measures taken to protect people from health-related risks associated with pesticides:
1. Adherence to label directions for pesticide use, including use of personal protection equipment (Y/N)
  2. Maintenance and cleansing of protection equipment after use (Y/N)
  3. Safe disposal of waste (cartons, bottles and bags) (Y/N)
- 7.4 Measures taken to avoid environment-related risks associated with pesticides:
1. Adherence to label directions for pesticide application (Y/N)
  2. Adjustment of planting time (Y/N)
  3. Application of crop spacing (Y/N)
  4. Application of crop rotation (Y/N)
  5. Application of mixed cropping (Y/N)
  6. Application of inter-cropping (Y/N)
  7. Perform biological pest control (Y/N)
  8. Use of biopesticides (Y/N)
  9. Adopting pasture rotation to suppress livestock pest population (Y/N)
  10. Systematic removal of plant parts attacked by pests (Y/N)
  11. Maintenance and cleansing of spray equipment after use (Y/N)
  12. Use one pesticide no more than two times or in mixture in a season to avoid pesticide resistance (Y/N)
- 7.5 Agricultural land area of the farm holding

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<sup>15</sup> WHO Class II or III pesticides as defined by WHO classification ([https://www.who.int/ipcs/publications/pesticides\\_hazard\\_rev\\_3.pdf](https://www.who.int/ipcs/publications/pesticides_hazard_rev_3.pdf)), or equivalent national classification.

<sup>16</sup> In principle, illegal pesticides refer to any products which do not comply with national regulations on pesticide management, such as un-registered, mislabeled, illegally imported etc. It does not cover "off-label uses," which could be considered as an illegal use action.

## 8. Use of agro-biodiversity-supportive practices

**Dimension:** Environmental

**Theme:** Biodiversity

The Convention on Biological Diversity (CBD) stresses the close relationship between agriculture activities and biodiversity, considering three levels of biodiversity: genetic level diversity; agrobiodiversity at production system level; and ecosystem level (wild) biodiversity. The way agriculture is practiced influences all three levels. Attempts to develop indicators of biodiversity for agriculture systematically consider a large number of sub-indicators, with no universally agreed sustainability criteria. Considering these constraints, and the importance of addressing biodiversity in the construction of Indicator 2.4.1, it is proposed to develop a sub-indicator that captures the efforts towards more sustainable agriculture that better contributes to biodiversity, by identifying a limited list of practices that are conducive to biodiversity conservation.

**Coverage:** All farm types

**Description:**

This sub-indicator measures the level of adoption of more sustainable agricultural practices that better contribute to biodiversity by the farm at ecosystem, species and genetic levels. This indicator addresses both crops and livestock. Specifically in the case of this sub-indicator the reference is the entire area of the farm holding as opposed to the agricultural area that is used for rest of the 10 sub-indicators.

In particular, two separate scoring systems depending on the applicability of the organic farming criterion have been proposed. Depending on whether organic certification system exists, countries will select one of the below two proposed set of criteria and thus will be evaluated/scored differently in terms of their sustainability status. According to this formulation, to secure green status, farms in countries with organic certification in place, will have to check 3 out of 6 criteria. On the contrary, farms operating in countries with no organic certification in place, will have to check 2 out of 5 criteria for obtaining the green status.

The detailed formulation of the criteria for the 2 scoring systems is described below:

### **A. Criteria for countries with organic certification systems/schemes:**

1. Leaves at least 10% of the holding area for natural or diverse vegetation. This can include natural pasture/grassland, maintaining wildflower strips, stone and wood heaps, trees or hedgerows, natural ponds or wetlands.
2. Farm produces agricultural products that are organically certified, or its products are undergoing the certification process.
3. Farm does not use medically important antimicrobials as growth promoters.
4. At least two of the following contribute to farm production: 1) temporary crops, 2) pasture, 3) permanent crops, 4) trees on farm, 5) livestock or animal products, and 6) aquaculture.
5. Practices crop or crop/pasture rotation involving at least 2 crops or crops and pastures on at least 80% of the farm cultivated area (excluding permanent crops and permanent pastures) over a period of 3 years. In case of a 2-crop rotation, the 2 crops have to be from different plant genus, e.g. a grass plus a legume, or a grass plus a tuber etc.
6. Livestock includes locally adapted breeds.

### Sustainability status:

- Green (desirable): The agricultural holding meets at least three of the above criteria
- Yellow (acceptable): The agricultural holding meets two of the above criteria
- Red (unsustainable): The agricultural holding meets none of the above criteria

### B. Criteria for countries with no organic certification systems/schemes:

1. Leaves at least 10% of the holding area for natural or diverse vegetation. This can include natural pasture/grassland, maintaining wildflower strips, stone and wood heaps, trees or hedgerows, natural ponds or wetlands.
2. Farm does not use medically important antimicrobials as growth promoters.
3. At least two of the following contribute to farm production: 1) temporary crops, 2) pasture, 3) permanent crops, 4) trees on farm, 5) livestock or animal products, and 6) aquaculture
4. Practices crop or crop/pasture rotation involving at least 2 crops or crops and pastures on at least 80% of the farm cultivated area (excluding permanent crops and permanent pastures) over a period of 3 years. In case of a 2-crop rotation, the 2 crops have to be from different plant genus, e.g. a grass plus a legume, or a grass plus a tuber etc.
5. Livestock includes locally adapted breeds.

### Sustainability status:

- Green (desirable): The agricultural holding meets at least two of the above criteria
- Yellow (acceptable): The agricultural holding meets one of the above criteria
- Red (unsustainable): The agricultural holding meets none of the above criteria

### Data items

Reference period: last calendar year

- 8.1 Percentage of the holding area covered by natural or diverse vegetation (not cultivated), including natural pasture or grasslands; wildflower strips; stone or wood heaps; trees or hedgerows; natural ponds or wetlands
- 8.2 Farm produced products (crops and/or livestock) that are organically certified (Y/N)
- 8.3 Farm produced products (crops and/or livestock) that are undergoing organic certification (Y/N)
- 8.4 Report the holding organic certification number
- 8.5 Report the name of organic certifying body
- 8.6 Area on which certified organic [CROP/LIVESTOCK] was produced
- 8.7 Use of medically important antimicrobials as growth promoter for livestock (Y/N)
- 8.8 Value of production of the holding (covered by sub-indicator 1)
  - 1 Temporary crops
  - 2 Pastures
  - 3 Permanent crops
  - 4 Trees on farm
  - 5 Livestock and animal products
  - 6 Aquaculture

- 8.9 Percentage of the cultivated area on which crop rotation or crop/pasture rotation involving at least two crops (excluding permanent crops and permanent pastures) from different plant genus is practiced over a 3 year period
- 8.10 Area of the agricultural holding covered by the (up to 5) main crops listed for sub-indicator 1 (excluding pasture)
- 8.11 List of different breeds and cross-breed and percentage of animals they represent for each animal species
- 8.12 Entire area of the farm holding

## 9. Wage rate in agriculture

**Dimension:** Social

**Theme:** Decent employment

The theme provide information on the remuneration of employees working for the farm and belonging to the elementary occupation group, as defined by the International Standard Classification of Occupation (ISCO-08 - code 92). It informs about economic risks faced by unskilled workers (those performing simple and routine tasks) in terms of remuneration received, the later benchmarked against the minimum wage set at national level in the agricultural sector. This sub-indicator allows distinguishing between holdings that pay a fair remuneration to its employees under the elementary occupation group, and agricultural holdings paying a remuneration to their employees belonging to the elementary occupation group that is below the minimum wage standard. In the latter case, agricultural holdings are deemed to be non-sustainable since the remuneration paid is not sufficient to ensure a decent living standard.

**Coverage:** Not applicable to farms that employ only family labour.

**Description:**

The sub-indicator measures the farm unskilled labour daily wage rate in Local Currency Units (LCU).

$$\text{Daily wage rate of unskilled hired labor} = \frac{\text{Total annual compensation}}{\text{Total annual hours worked}} * 8 \text{ hour}$$

Where; compensation is both monetary and in kind payments expressed in Local Currency Units (LCU).

**Sustainability criteria:**

Unskilled labour wage rate in relation to national or agriculture sector minimum wage rate. In case there is no national or agriculture sector minimum wage rate, the national poverty line is used instead:

- **Green (desirable):** If the wage rate paid to unskilled labour is above the minimum national wage rate or minimum agricultural sector wage rate (if available). Default result for farms not hiring labour.
- **Yellow (acceptable):** if the wage rate paid to unskilled labour is equals to the minimum national wage rate or minimum agricultural sector wage rate (if available).
- **Red (unsustainable):** if the wage rate paid to unskilled labour is below the minimum national wage rate or minimum agricultural sector wage rate (if available).

**Data items**

Reference period: last calendar year

- 9.1 Unskilled workers hired on the agricultural holding (Y/N)
- 9.2 Average pay in-cash and/or in-kind paid to the hired unskilled worker per day (of 8 hours)
- 9.3 Minimum agricultural sector wage rate (if available) or minimum national wage rate
- 9.4 Agricultural land area of the farm holding



## 10. Food Insecurity Experience Scale (FIES)

**Dimension:** Social

**Theme:** Food security

FIES is a metric of severity of food insecurity at the household level that relies on people's direct yes/no responses to eight simple questions regarding their access to adequate food. It is a statistical measurement scale similar to other widely-accepted statistical scales designed to measure unobservable traits such as aptitude/intelligence, personality, and a broad range of social, psychological and health-related conditions.

**Coverage:** Only household farms

### **Description:**

The Food Insecurity Experience Scale (FIES) produces a measure of the severity of food insecurity experienced by individuals or households, based on direct interviews. The FIES questions refer to the experiences of the individual respondent or of the respondent's household as a whole.

The FIES is derived from two widely-used experience-based food security scales: the U.S. Household Food Security Survey Module and the Latin American and Caribbean Food Security Scale (Spanish acronym ELCSA). It consists of a set of eight short yes/no questions asked directly to people. The questions focus on self-reported, food-related behaviours and experiences associated with increasing difficulties in accessing food due to resource constraints. The FIES is based on a well-grounded construct of the experience of food insecurity composed of three domains: uncertainty/anxiety, changes in food quality, and changes in food quantity.

This sub-indicator is SDG indicator 2.1.2 contextualised for a farm survey.

**Sustainability criteria:** Level on FIES scale

- **Green (desirable): Mild food insecurity**<sup>17</sup>
- **Yellow (acceptable)**<sup>18</sup>: **Moderate food insecurity**
- **Red (unsustainable): Severe food insecurity**

### **Data items**

Reference period: last 12 months

- 10.1 The respondent's recollection that he/she (or any other adult in the household) would be worried about not having enough food to eat due to lack of money or other resources
- 10.2 The respondent's recollection that he/she (or any adult in the household) was unable to eat healthy and nutritious food because of lack of money or other resources
- 10.3 The respondent's recollection that he/she (or any adult in the household) only ate a few kinds of food due to lack of money or other resources

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<sup>17</sup> Computation of food insecurity level is described in details in e-learning course on SDG 2.1.2: <http://www.fao.org/elearning/#/elc/en/course/SDG212>

<sup>18</sup> The terminology "Acceptable" must be read within the context of SDG 2.4.1; it should be interpreted as a situation that nevertheless merits attention and actions aimed at improvement.

- 10.4 The respondent's recollection that he/she (or any adult in the household) had to skip a meal because there was no enough money or other resources for food
- 10.5 The respondent's recollection that he/she (or any adult in the household) ate less than he/she thought he should due to lack of money or other resources
- 10.6 The respondent's recollection that his/her household ran out of food because of a lack of money or other resources
- 10.7 The respondent's recollection that he/she (or any adult in the household) was hungry but not eating due to lack of money or other resources for food
- 10.8 The respondent's recollection that he/she (or any adult in the household) did not eat for a whole day because of a lack of money or other resources
- 10.9 Agricultural land area of the farm holding

## 11. Secure tenure rights to land

**Dimension:** Social

**Theme:** Land tenure

The sub-indicator allows assessing sustainability in terms of rights over use of agricultural land areas. Since agricultural land is a key input for agricultural production, having secure rights over land ensures that the agricultural holding controls such a key asset and does not risk losing the land used by the holding for farming.

Evidence shows that farmers tend to be less productive if they have limited access to and control of economic resources and services, particularly land. Long-lasting inequalities of economic and financial resources have positioned certain farmers at a disadvantage relative to others in their ability to participate in, contribute to and benefit from broader processes of development.

As such, adequate distribution of economic resources, particularly land, help ensure equitable economic growth, contributes to economic efficiency and has a positive impact on key development outcomes, including poverty reduction, food security and the welfare of households.

This sub-indicator is SDG indicator 5.a.1, customised for SDG indicator 2.4.1.

**Coverage:** All farms types

**Description:**

The sub-indicator measures the ownership or secure rights over use of agricultural land areas using the following criteria:

- Formal document issued by the Land Registry/Cadastral Agency
- Name of the holder listed as owner/use right holder on legally recognized documents
- Rights to sell any of the parcel of the holding
- Rights to bequeath any of the parcel of the holding

**Sustainability criteria:**

Level of security of access to land:

- **Green (desirable):** has a formal document with the name of the holder/holding on it, or has the right to sell any of the parcel of the holding, or has the right to bequeath any of the parcel of the holding
- **Yellow (acceptable):** has a formal document even if the name of the holder/holding is not on it
- **Red (unsustainable):** no positive responses to any of the 4 questions above

**Data items**






Reference period: last calendar year

11.1 Type of formal document for any of the agricultural land of the holder/holding that it holds (alternatively 'possess, use, occupy) issued by the Land Registry/Cadastral Agency

- 1 Title deed
- 2 Certificate of customary tenure
- 3 Certificate of occupancy
- 4 Registered will or registered certificate of hereditary acquisitions
- 5 Registered certificate of perpetual / long term lease
- 6 Registered rental contract
- 7 Other

- 11.2 Name of any member of the holding listed as an owner or use right holder on any of the legally recognized documents
- 11.3 The right of the holder/holding to sell any of the parcel of the holding
- 11.4 The right of the holder/holding to bequeath any of the parcel of the holding
- 11.5 Agricultural land area of the farm holding

**Annex 4 List of application**

	<p><b>Tonlesap App (AMK)</b> provides technical knowledge on agricultural products (rice, cassava, horticulture crops, chickens, pigs, cows, etc.) and agriculture-related news to users. This application also helps users connect with agri-input suppliers (both retailers and wholesalers) for fertilizers, pesticides, plastic mulch, drip tools, and others; with experts to share agricultural-related problems and solutions; with creditors for capital and investments.</p>
	<p><b>Guide to Raising Pigs</b> give information to Cambodia farmers on feeding pigs, how to produce food, how to care of them and vaccination.</p>
	<p><b>MAFF News (MAFF, Cambodia)</b> is an application that update and publish news related to agriculture, forestry, and fishery as well as news related to activities of ministry.</p>
	<p><b>CAMAgriMarket</b> is provides consistent, accurate and timely market information and intelligence to all concerned stakeholders. This is being done in order to assist the stakeholders in generating higher returns from their relevant enterprises, and to contribute to economic growth and poverty reduction.</p>
	<p><b>ARDB HRMS App</b> is developed by the Agricultural And Rural Development Bank of Cambodia; a very simple and easy to use for leave request, approve leave request, and report leave status.</p>