

SEEA Agriculture, Forestry and Fisheries



System of
Environmental
Economic
Accounting

Outline

- Learning objectives
- Review of basics (10 min.)
- Level 1 What? why? (compilers)
 - Concepts (20 min.)
 - Combined Presentations
 - Group exercise and discussion (30 min.)
- Level 2
 - Physical Supply and Use Accounts (10 min)
 - Asset Accounts (10 min)
- Closing discussion (10 min.)



Learning objectives

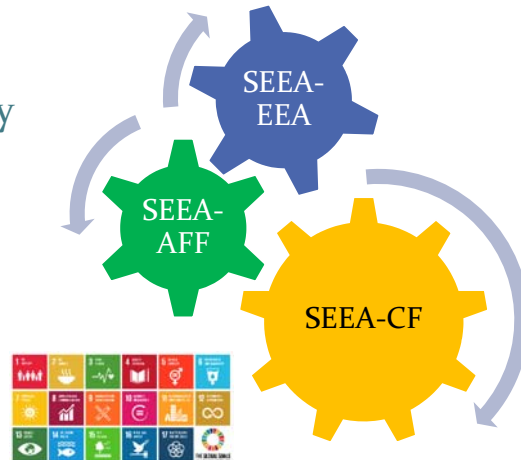
- Level 1
 - Understand what **SEEA Agriculture, Forestry and Fisheries (AFF)** is and why it is important
 - Understand how AFF links to the SEEA-CF and SEEA-EEA
 - Understand the basic concepts of **Combined presentations**
 - Learn the steps of compiling an Combined presentations
- Level 2
 - Learn to apply **Physical Supply and Use Tables**
 - Learn to apply **Asset Accounts**

In the news...



Basic concepts

- Why are Agriculture, Forestry and Fisheries accounts important?
- **Reminder:**
 - Links to SDGs, SEEA-CF, SEEA-EEA



Why are Agriculture, Forestry and Fisheries accounts important?

- **Regional concerns about**
 - **Food security** and food loss
 - **Deforestation** and degradation of forests
 - **Sustainability** of agricultural, forestry and fishery activities
 - Equitable **access** to resources and share of **benefits**
- **SEEA-AFF: Internationally-agreed methodology for Agriculture, Forestry and Fisheries activities**
 - **Integrates** several FAO datasets along common approach
 - **Applies** SEEA-CF and links to SEEA-EEA
 - Links to **reporting** (e.g., air emissions to IPCC; SDGs)
- **Policy issues**
 - What are cross-sectoral impacts of AFF?
 - How will economic growth and related policies affect AFF?

AFF & SDGs



Food security



Equal rights for women to economic resources and land



Increase water use efficiency



Global food loss index



Sustainable fisheries

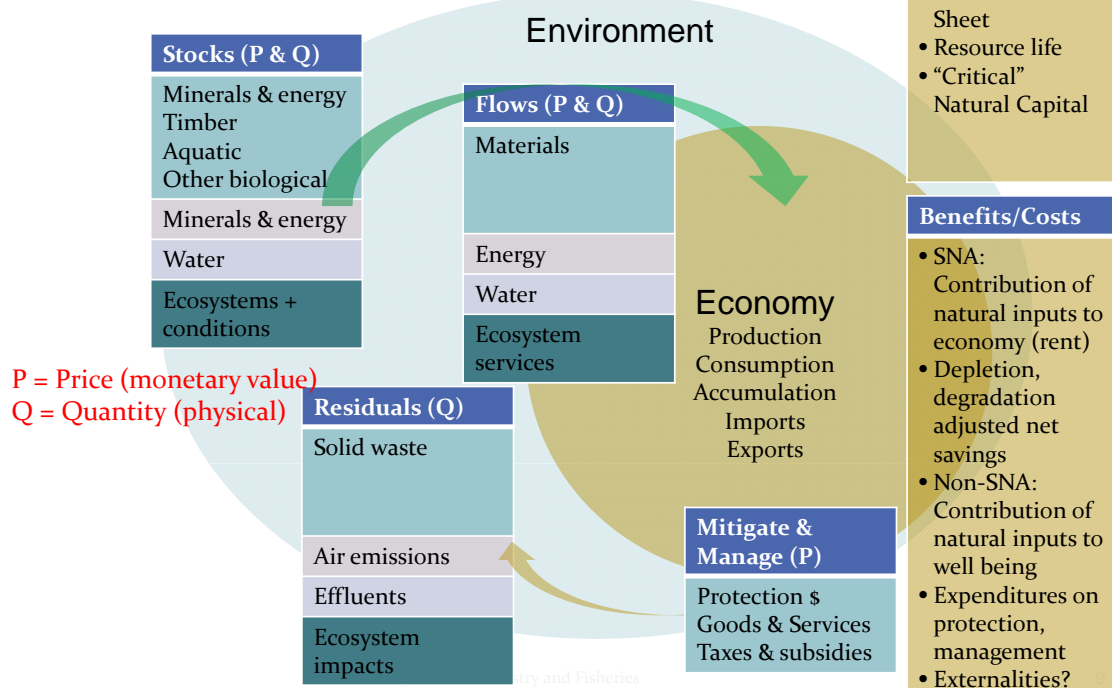


Sustainable use of terrestrial ecosystems (forests)

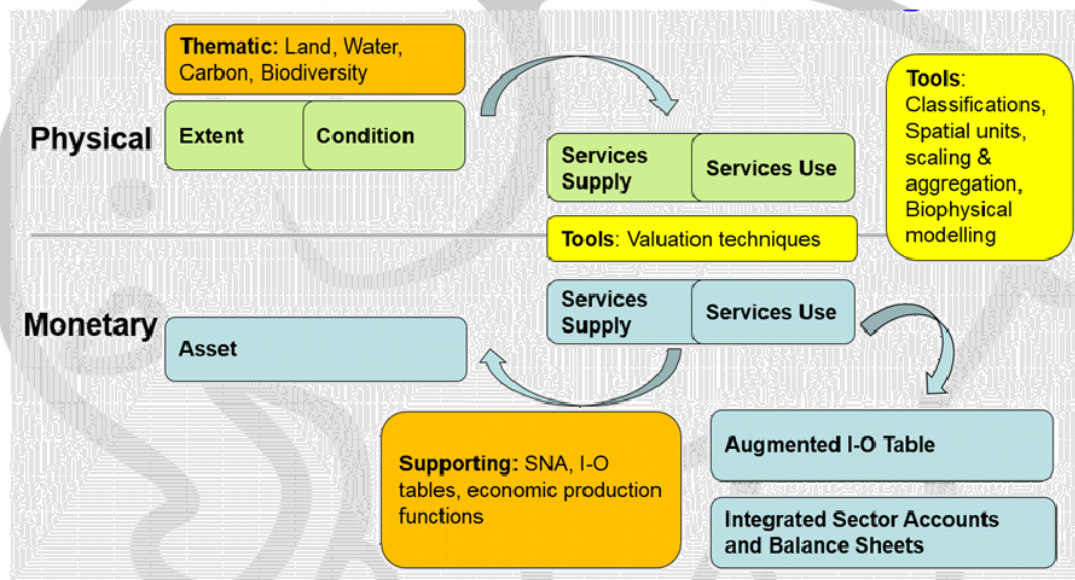
Discussion on linkages

- Which SDG targets may have a **positive** influence on “food security”?
 - e.g., preventing desertification will improve productivity
- Which SDG targets may have a **negative** influence?
 - e.g., economic growth may result in converting prime agricultural land to settlements
- Which SDG targets may be **positively** influenced by “food security”?
 - e.g., more food will contribute to better human health
- Which SDG targets may be **negatively** influenced?
 - e.g., growing more food may require converting forests to agriculture

Stocks & flows in the SEEA



SEEA-EEA Overview



It's not all in one place!

Also true for agriculture and fisheries

TABLE 2: Coverage of accounting frameworks with respect to forests

Framework	Type of forest information								
	Flow of forest products		Timber resources		Economic activity connected to forestry	Forest-land	Forest condition	Forest ecosystem services	
	Physical	Monetary	Physical	Monetary				Physical	Monetary
SNA		✓		✓	✓				
SEEA CF			✓	✓	✓	✓			
SEEA AFF	✓	✓	✓	✓	✓	✓			
SEEA EEA						✓	✓	✓	✓

Source: World Bank. 2017. Forest Accounting Sourcebook.

SNA = System of National Accounts: records economic production, investment and wealth

SEEA-CF = System of Environmental-Economic Accounting: records assets and flows

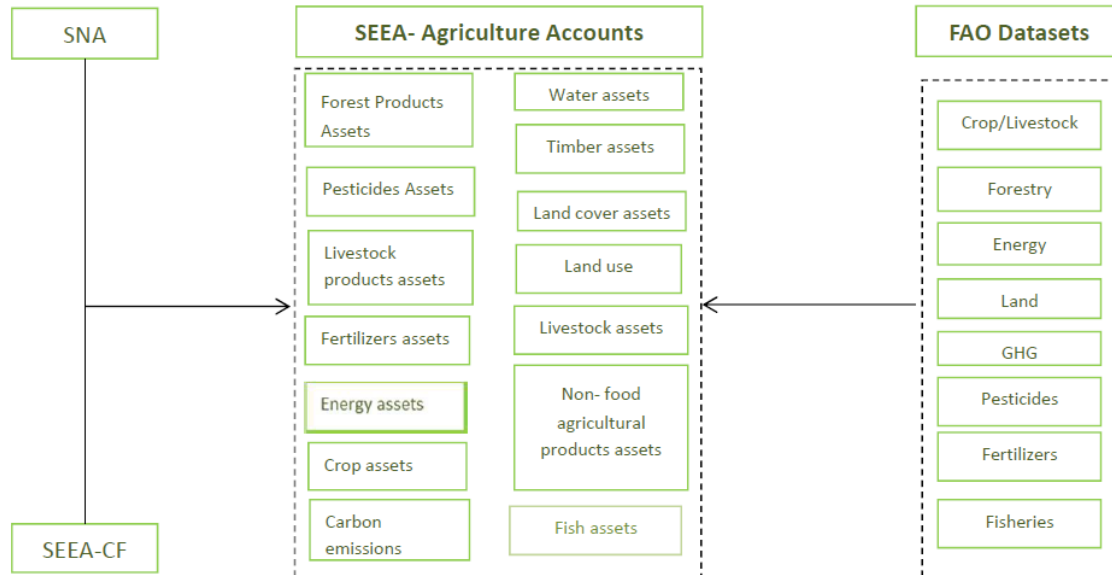
SEEA-AFF = Agriculture, Forestry and Fisheries: activity focus on assets and flows

SEEA-EEA = Experimental Ecosystem Accounting: records contribution of ecosystems

Level 1

- FAO datasets and data domains
- Base accounts
- Example of “themes” (Forestry in AFF)
- Exercise on Combined Presentations

Uses SEEA-CF to integrate FAO datasets

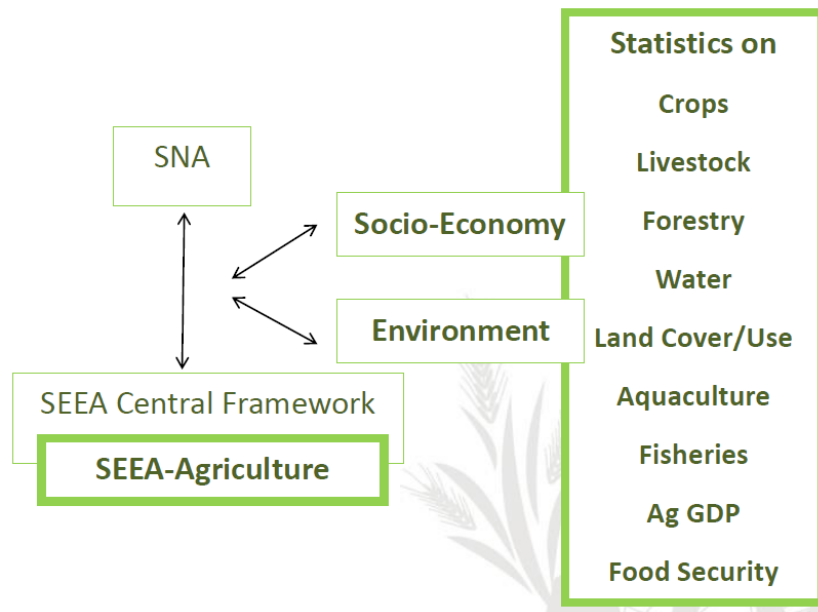


Adds detail: supply/use by activity, commodities, pesticides, fertilizers...

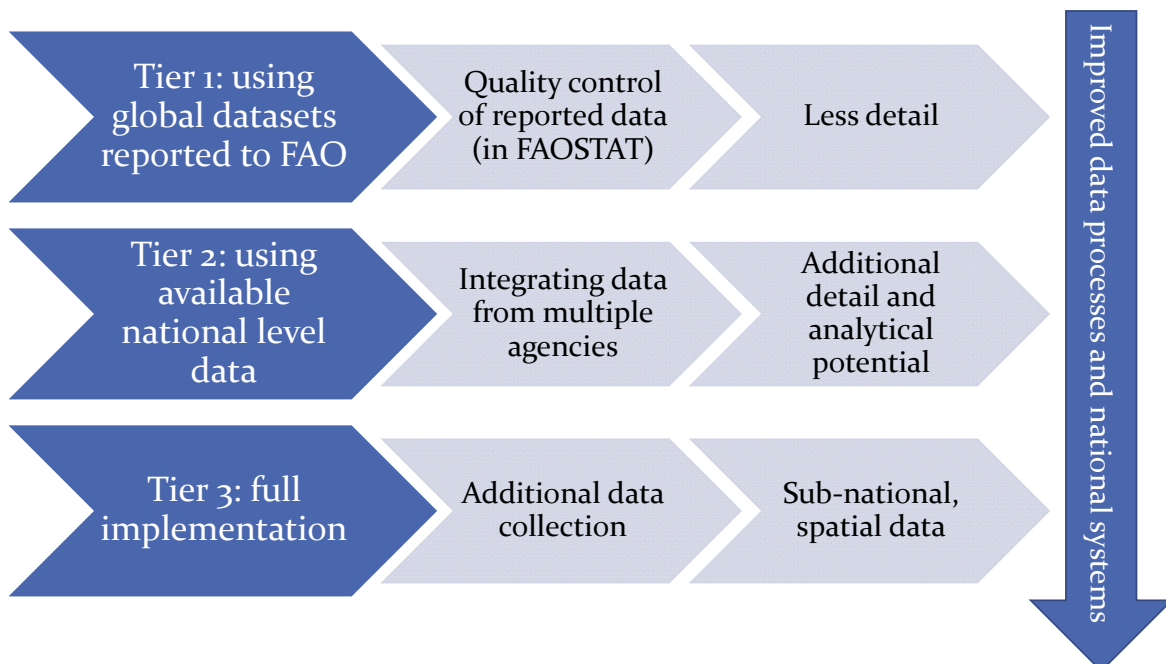
Data domains

1. Agricultural products and related environmental assets
2. Forestry products and related environmental assets
3. Fisheries products and related environmental assets
4. Water resources
5. Energy
6. Greenhouse Gas (GHG) emissions
7. Fertilizers, nutrient flows and pesticides
8. Land
9. Soil resources
10. Other economic data

AFF links social, economic and environmental dimensions

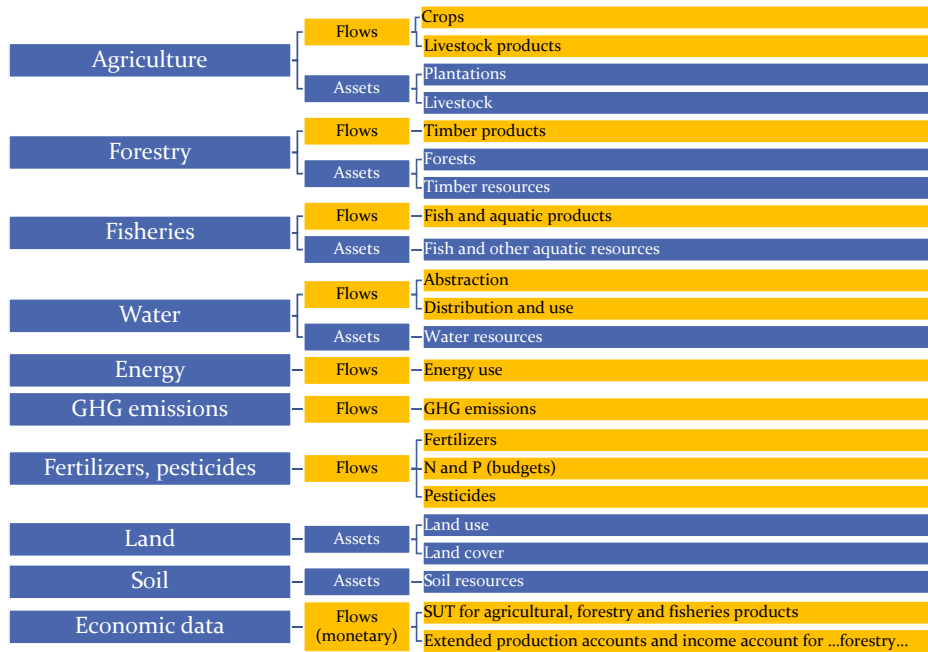


A tiered approach

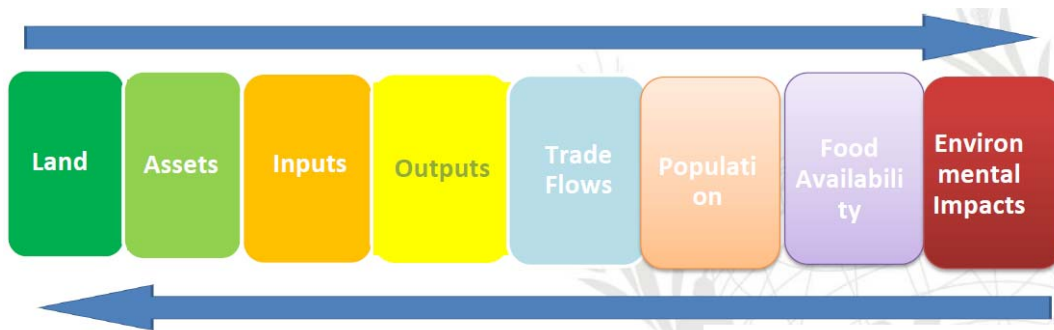




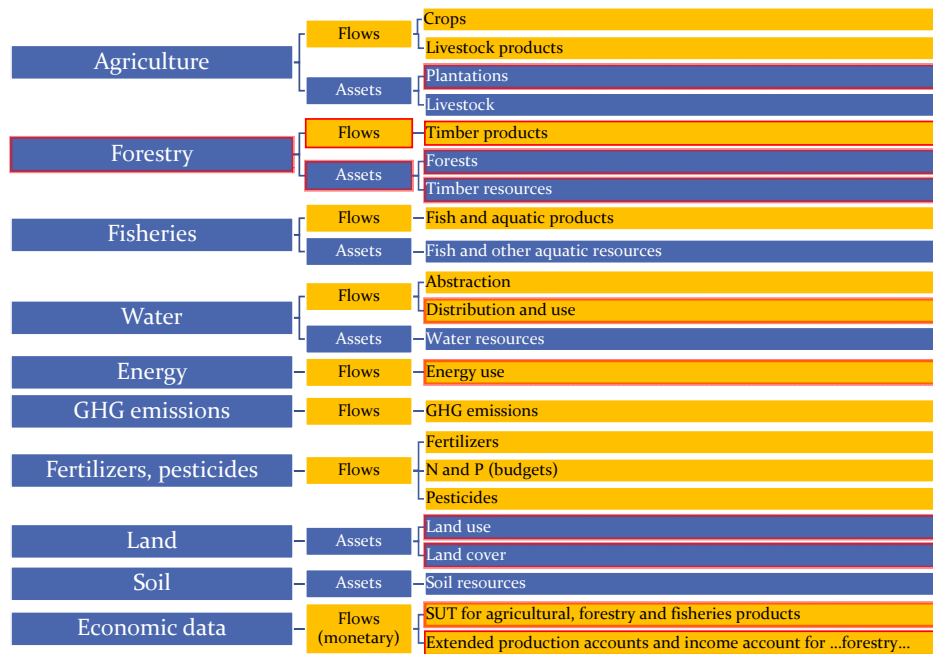
AFF Base Accounts



One framework for analysis across data domains



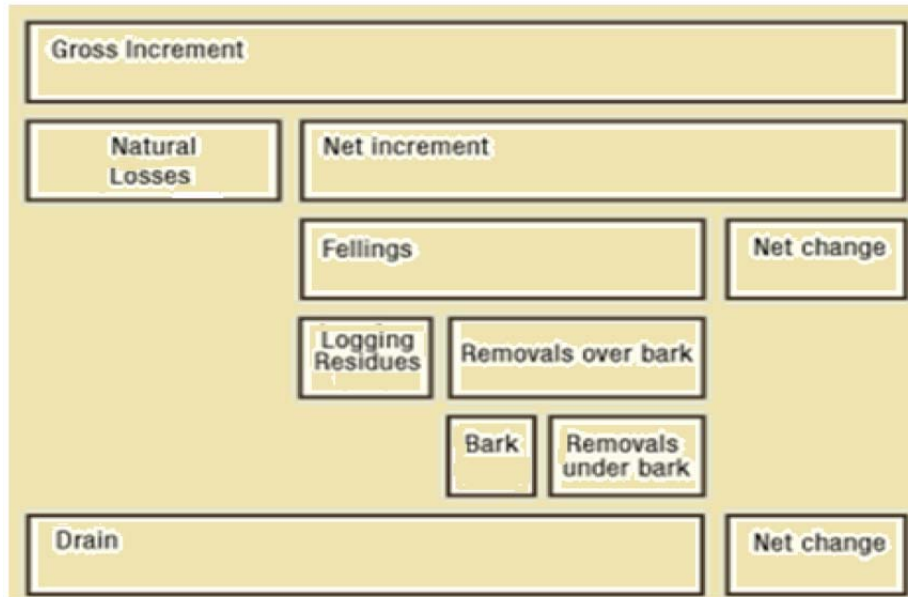
Forestry themes



Forests in SEEA-AFF

- **Complement** to the SEEA-CF treatment
- Like the SEEA-CF, SEEA-AFF uses the FAO/FRA categories of forest land
 - However, in the broader land-use accounts, land use for forestry is distinct from land used for other purposes, including environmental maintenance
- **Asset Account** for forests concerns areas of land identified as “forest” and “other wooded land”
- “Other land with tree cover” or “Wood land on agricultural land” is **excluded**
- “Forested land” measured in accordance with FAO/FRA, based on **land use** rather than cover.
- Timber resources **Asset Account** records the volume of all marketable standing timber
- Physical Flow Account limited to **timber** (can be extended, though)
- **Monetary** data are SNA-consistent → but not much text in manual

Timber assets and product flows



(Päivinen et al. 1999)

Timber resources: Linking physical tables

Table 3.7: Physical asset account for timber resources (cubic metres)

Type of timber resource	Opening stock	Additions to stock			Reductions in stock				Net changes in stock	Closing stock									
		Natural growth	Reclassifications	Total additions	Felling Removals	Felling residues	Natural losses	Catastrophic losses			Reclassifications	Total reductions							
Cultivated timber resources																			
Natural timber resources																			
Total																			

Product	SUPPLY TABLE			Output			Total output	Imports	Total Supply
	Forestry activity (ISIC 021)	Logging activity (ISIC 022)	Other industries	Forestry activity (ISIC 021)	Logging activity (ISIC 022)	Other industries			
Net annual increment									
Gross fellings									
Felling residues (not removed)									
Removals (over bark)									
Bark									
Removals (under bark)									
Roundwood (under bark)									
of which Industrial roundwood									
-Sawlogs & veneer logs									
-Pulpwood, round & split									
-Other industrial roundwood									
Wood fuel									

Forestry (ISIC 021) = growing
Logging (ISIC 022) = harvesting

Table 3.5: Physical flow account for timber products (cubic metres)



Monetary supply-use table

Supply Use

Table 3.10 Monetary supply and use table for agricultural, forestry and fisheries products (currency units)

	SUPPLY TABLE						USE TABLE					
	Output	Imports	Trade and transport margins	Taxes on products	less Subsidies on products	Total supply at purchasers prices	Intermediate consumption	Household final consumption	Gross fixed capital formation	Changes in inventories	Exports	Total Use at purchasers prices
	Agriculture, Forestry and Fisheries units											
Agricultural products												
Crop products												
Maize												
Rice												
Wheat												
Palm oil												
Sugar												
Potatoes												
Fodder												
Other crops												
Total												
Livestock products												
Livestock raising												
Eggs												
Raw milk												
Honey												
Other livestock products												
Total												
Other agricultural products												
Total Agriculture												
Forestry products												
Forestry												
Logging												
Other forestry products												
Total Forestry												
Fisheries products												
Aquaculture												
Capture fisheries												
Total Fisheries												

Products



Monetary production and income

Intermediate consumption Production and income

Table 3.11 Extended production and income account for agricultural, forestry and fisheries activities (currency units)

	Output	Intermediate consumption					Gross value added	Compensation of employees	Gross operating surplus & Gross mixed income	Taxes less subsidies on production and imports	Gross fixed capital formation		Changes in inventories		Consumption of fixed capital (Depreciation)	Employment (000 people)
		Water	Energy	Fertiliser	Other	Total					Cultivated biological resources	Other produced assets	Cultivated biological resources	Other changes in inventories		
	(1)					(2)	(3) = (1)-(2)	(4)	(5) = (3) - (4)	(6)				(7)	(8)	
Agriculture																
Cropping																
Animal production																
Mixed farming																
Support activities to agriculture																
Hunting and trapping																
Total Agriculture																
Forestry and logging																
Forestry																
Logging																
Gathering non-wood forest products																
Support services to forestry																
Total Forestry and logging																
Fisheries																
Fishing - marine																
Fishing - freshwater																
Aquaculture - marine																
Aquaculture - freshwater																
Total Fisheries																
Total Agriculture, Forestry and Fisheries																
Total Economy																

Sector



Accounting issues

- **Scoping of products:**
 - Main (physical) outputs of ISIC rev. 4 01-03 Divisions
 - Distinction between primary and derived products
 - Forestry ≠ Logging
 - Fisheries include aquaculture
 - **Intra-unit flows** own-account production and use,
 - Usually **not** recorded in national accounting if not inter-activity (at ISIC group level)
 - Two standard exceptions: use for final consumption; use for capital formation ← **Examples?**
 - Principle of “exhaustive” recording of physical flows, also when use is in the same activity, introduced in SEEA-Agriculture.
 - e.g. seeds for sowing, besides those for feeding, are counted (some of these flows are hardly visible in monetary transactions)
- ➔ **IN PHYSICAL TERMS, ALL FLOWS ARE RECORDED**



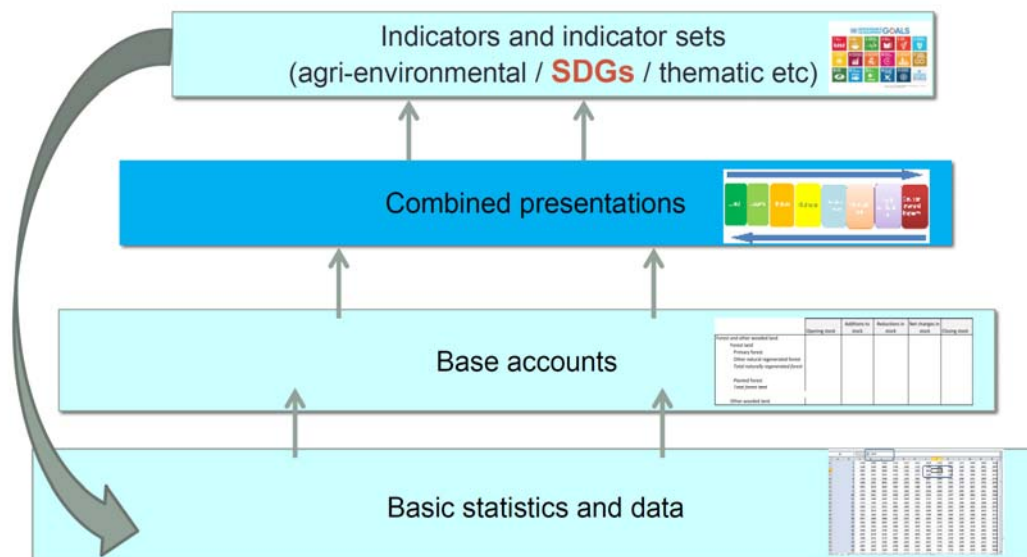
Group exercise

- Work in groups of 3-5 (30 minutes to complete)
- **Need:**
 - Access to internet
 - One computer per group (Excel and *AFF Accounts Table.xlsx*)
- Find and calculate combined presentation for your country
- Report results for your country

But first...some concepts and definitions

- Combined presentations
 - Land area for agriculture
 - Synthetic and organic fertilizers
 - Crop production
 - Trade flows (imports and exports)
 - Population (rural and urban)
 - Food availability
 - Environmental impacts

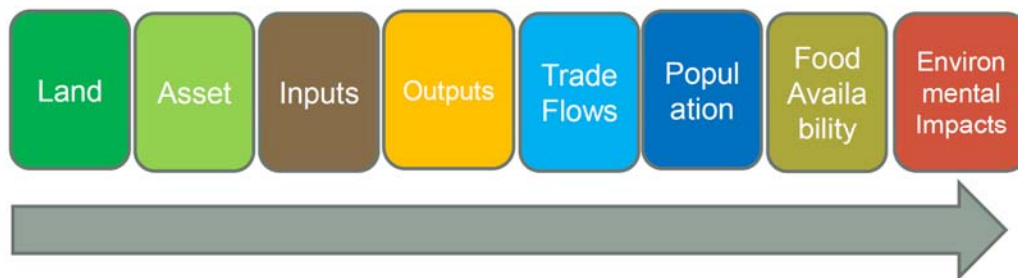
Combined presentations



Combined presentations (= Dashboard)

- COMBINE indicators from accounts using different measurement units with other explanatory information
- AFF includes 4 thematic combined presentations
 - Activity- and product-specific inputs
 - Food product consumption and waste
 - Use of environmental assets
 - Cross-industry and activity perspectives
- ...and:
- **Reference Combined Presentation**

Combined presentations

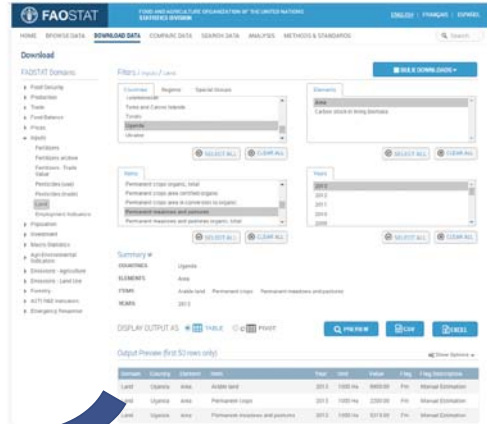


- **Reference Combined Presentation** is a cross-cutting perspective based on the above structure

Reference Combined Presentation

Component	Indicator	Units	Value
1. Assets	Agricultural Land Area - Arable land	'000 ha	
	Agricultural Land Area - Permanent crops	'000 ha	
	Agricultural Land Area - Permanent meadows and pastures	'000 ha	
	Agricultural Land Area - Total	'000 ha	
	Harvested area	'000 ha	
2. Inputs	Biomass stock	million tonnes	
	Livestock (number of heads)	'000 heads	
	Producing animals	'000 heads	
	Water withdrawal	m ³	
	Energy use	TJ	
	Synthetic fertilizer - N	'000 tonnes	
	Synthetic fertilizer - P ₂ O ₅	'000 tonnes	
	Synthetic fertilizer - K ₂ O	'000 tonnes	
	Synthetic fertilizer - Total	'000 tonnes	
	Organic fertilizer - N	'000 tonnes	
3. Outputs	Actual crop production	'000 tonnes	
	Gross crop production value	USD million (current)	
	Value added	USD million (current)	
	Total GDP	USD million (current)	
4. Trade flows	Exports	'000 heads	
		'000 tonnes	
		USD million (current)	
	Imports	'000 heads	
5. Population	Urban population	'000 persons	
	Rural population	'000 persons	
6. Food availability	Total population	'000 persons	
	Food	'000 tonnes	
7. Environmental impacts	Food supply	Kcal/capita/day	
	Agricultural GHG emissions (CO ₂ eq from Arable and Permanent Cropland)	gigagrams	
	Agricultural GHG emissions (CO ₂ eq from Permanent meadows and pastures)	gigagrams	
8. Calculated indicators	Agricultural GHG emissions (CO ₂ eq from agriculture) - Total	gigagrams	
	GHG emissions per '000 tonnes crop production	gigagrams per '000 tonnes	
	GHG emissions per '000 rural population	gigagrams per person	
	GHG emissions per '000 tonnes food	gigagrams per '000 tonnes	

- Most recent year?
- Look up values in red in FAOStat
- Transcribe to table
- Calculate totals and indicators



Calculate land area for agriculture

- <http://www.fao.org/faostat/en/#data/RL>
- Calculate: Land area for agriculture =
 - ITEMS: Arable land + Permanent crops + Permanent meadows and pastures
 - ELEMENTS: Area

Arable land: land under temporary agricultural crops (multiple-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category. Arable land is not meant to indicate all land that is potentially cultivable

Permanent crops: land cultivated with long-term crops which do not have to be replanted for several years (such as cocoa and coffee); 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")

Permanent meadows and pastures: land used permanently (five years or more) to grow herbaceous forage crops, either cultivated or growing wild (wild prairie or grazing land)
Land Area (000 ha)

Calculate total synthetic fertilizer (TSF)

- Total synthetic fertilizer used for agriculture =
 - <http://www.fao.org/faostat/en/#data/RF>
 - ITEMS: Nitrogen fertilizers (N total nutrient) + Phosphate Fertilizers (P₂O₅ total nutrients) + Potash Fertilizers (K₂O total nutrients)
 - **ELEMENTS: Inputs → Consumption in nutrients?**
 - YEARS: Most recent available

Calculate actual crop production

Crops Primary
Cereals
Roots and tubers
Pulses
Nuts
Oil-bearing crops
Vegetables
Fruits
Fibres
Fodder Crops
Sugar Crops
Stimulants
Spices
Other crops

- <http://www.fao.org/faostat/en/#data/QC>
- **ELEMENTS: Production quantity**
- **ITEMS: Select 10 most important crops**
- **Total (in '000 tonnes)**

Calculate trade flows

- <http://www.fao.org/faostat/en/#data/TP>
- **ELEMENTS:**
 - Import Quantity and Value
 - Export Quantity and Value
- **ITEMS:** 10 crops selected for crop production

Calculate population

- <http://www.fao.org/faostat/en/#data/OA>
- **ELEMENTS:**
 - Urban Population ('000 people) +
 - Rural Population ('000 people) =
 - Calculate Total Population
- **ITEMS:**
 - Population (Est. & Proj.)

Calculate food availability

- Food balance sheets:
 - <http://www.fao.org/faostat/en/#data/FBS>
 - ELEMENTS: Food
 - ITEMS: selected crops
- Total food quantities from selected primary crops ('000 tonnes)
 - Cereals
 - Roots and tubers
 - Pulses
 - Nuts
 - Vegetables
 - Fruits
 - Sugar crops
 - Stimulants
 - Spices

Calculate environmental impacts

- By land type (GHG emissions gigagrams CO₂ equivalent)
- <http://www.fao.org/faostat/en/#data/GL> (net emissions/removals (CO₂ eq))
 - Arable and permanent cropland +
 - Permanent meadows and pastures =
 - Total
- For your country, calculate and present:
- For year _____

8. Calculated indicators	GHG emissions per '000 tonnes crop production	gigagrams per '000 tonnes	
	GHG emissions per '000 rural population	gigagrams per person	
	GHG emissions per '000 tonnes food	gigagrams per '000 tonnes	

Extensions and applications

- Key environmental and economic information are also available!
- Information can be used to derive indicator:
 - Agricultural GHG emissions/ \$ of crop production
 - % of national GDP in crop production
- Could repeat for different years or sub-regions
- QAQC with national and subnational data from the country
- Information to inform policy decision making on economic and environmental issues

Welcome to Level 2

- Physical flow accounts
- Asset accounts



Physical flow accounts

- Record the **flows** of materials and energy from the environment, within the economy, and back to the environment (residuals)
- For example: the flows of water from the environment to the economy, the use of water in the economy, and the polluted or treated water back to the environment.
- Accounting principles
 - Total supply = Total use

Where

- Supply = Domestic production + Imports
- Use = Domestic consumption + Exports



- This is the Physical flow account for crops
- We'll work with a simplified version, but note:
 - Records raw and processed quantities
 - Selection of products is country-specific
 - Note: Household production is part of Agriculture Industry**

Table 3.1: Physical flow account for crops (tonnes of raw commodity equivalents)

SUPPLY TABLE	Output					Imports	Total Supply
	Gross production	Harvest losses	Agricultural industry		Manufacturing industry		
			Total	of which household production			
Selected products*							
Maize (raw)							
Maize (processed)							
Rice (raw)							
Rice (processed)							
Wheat (raw)							
Wheat (processed)							
Palm oil (raw)							
Palm oil (processed)							
Sugar (raw)							
Sugar (processed)							
Potatoes (raw)							
Potatoes (processed)							
Fodder (raw)							
Fodder (processed)							
Other food crops (raw)							
Other non-food crops (raw)							
Other non-food crops (processed)							

USE TABLE	Intermediate consumption				Household final consumption			Changes in inventories		Exports	Total Use
	Agricul. ind. (Food)	Agricul. ind. (Non-food)	Generation of energy products	Non-food processing	Food consumption	of which food waste	Other uses	Proc. harvest losses	Other changes in inventories		
Maize (raw)											
Maize (processed)											
Rice (raw)											
Rice (processed)											
Wheat (raw)											
Wheat (processed)											
Palm oil (raw)											
Palm oil (processed)											
Sugar (raw)											
Sugar (processed)											
Potatoes (raw)											
Potatoes (processed)											
Fodder (raw)											
Fodder (processed)											
Other food crops (raw)											
Other food crops (processed)											
Other non-food crops (raw)											
Other non-food crops (processed)											

* Selection of products is indicative to illustrate the logic of the accounting structure; countries will determine the actual key products for inclusion.



Flows in base accounts (the yellow parts)

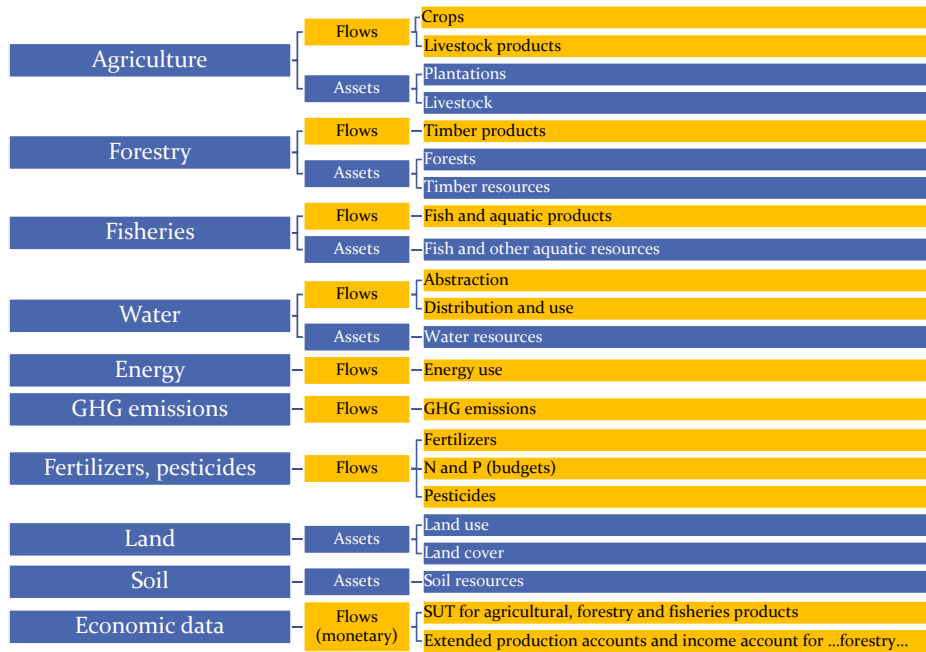


Table 3.1 (simplified) – Physical flow account for crops (tonnes)

Product	SUPPLY					USE													
	OUTPUT		TOTAL OUTPUT	Imports	Total Supply	Intermediate consumption					HH consumption			Changes in inventories			Export	Total Use	
	Ag. Industry	Manu. Industry				Agricul. Ind. (Feed)	Agricul. Ind. (Seed)	Generation of energy product	Food Processing	Non-food processing	Food	Of which food waste	Other uses	Post-harvest losses	Other changes in inventories				
Maize	376		376	1	377	293	1		121	9							-60.08	13.08	377
Maize (processed)	N.A.	132	132	23	155						112	9	11	13.08	9.92				155

MU= tonnes of raw maize equivalent

Legend

Not applicable

Data Source: FAOSTAT <http://faostat3.fao.org/home/E>

Interpret the table:

- Where does **maize** (raw) come from (output) and go?
- Where does **maize** (processed) come from?



Total supply of maize (raw)

SUPPLY

USE

Product	OUTPUT		TOTAL OUTPUT	Imports	Total Supply	Intermediate consumption					HH consumption			Changes in inventories		Export	Total Use	
	Ag. Industry	Manu. Industry				Agricul. Ind. (Feed)	Agricul. Ind. (Seed)	Generation of energy product	Food Processing	Non-food processing	Food	Of which food waste	Other uses	Post-harvest losses	Other changes in inventories			
Maize	376		376	1	377	293	1		121	9						-60.08	13.08	377
Maize (processed)	N.A.	132	132	23	155						112		9	11	13.08	9.92	155	

- **Total output** = Ag. Industry
- **Total supply** = Total output + Imports
= 376 + 1 = 377



Intermediate consumption of maize (raw)

SUPPLY

USE

Product	OUTPUT		TOTAL OUTPUT	Imports	Total Supply	Intermediate consumption					HH consumption			Changes in inventories		Export	Total Use	
	Ag. Industry	Manu. Industry				Agricul. Ind. (Feed)	Agricul. Ind. (Seed)	Generation of energy product	Food Processing	Non-food processing	Food	Of which food waste	Other uses	Post-harvest losses	Other changes in inventories			
Maize	376		376	1	377	293	1		121	9						-60.08	13.08	377
Maize (processed)	N.A.	132	132	23	155						112		9	11	13.08	9.92	155	

- **Intermediate consumption** = Feed + Seed + Generation of energy products + Food processing + Non-food processing
= 293 + 1 + 0 + 121 + 9 = 424

How can we be using more than we produced?



Changes in inventories and exports of maize (raw)

SUPPLY

USE

Product	OUTPUT		TOTAL OUTPUT	Imports	Total Supply	Intermediate consumption				HH consumption			Changes in inventories		Export	Total Use	
	Ag. Industry	Manu. Industry				Agricul. Ind. (Feed)	Agricul. Ind. (Seed)	Generation of energy product	Food Processing	Non-food processing	Food	Of which food waste	Other uses	Post-harvest losses			Other changes in inventories
Maize	376		376	1	377	293	1		121	9					-60.08	13.08	377
Maize (processed)	N.A.	132	132	23	155						112		9	11	13.08	9.92	155

- **Post harvest losses:** quantities lost through wastage during the year at all stages between agricultural output and final consumption
- **Other changes in inventories:** changes in the holding of crop products during the reference period at all stages between output and final sale of processed products
- **Changes in inventories** = Post harvest losses + other changes in inventories (-60.08; that is, maize was taken from inventory)
- Exports = 13.08



Total use of maize (raw)

SUPPLY

USE

Product	OUTPUT		TOTAL OUTPUT	Imports	Total Supply	Intermediate consumption				HH consumption			Changes in inventories		Export	Total Use	
	Ag. Industry	Manu. Industry				Agricul. Ind. (Feed)	Agricul. Ind. (Seed)	Generation of energy product	Food Processing	Non-food processing	Food	Of which food waste	Other uses	Post-harvest losses			Other changes in inventories
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Maize (processed)	N.A.	132	132	23	155						112		9	11	13.08	9.92	155

- **Total use** = Intermediate consumption + Household consumption + Changes in inventories + Exports
- Total use = Total supply (= 424 + (-60.08) + 13.08 = 377)



Total output of maize (processed)

SUPPLY

USE

Product	OUTPUT		TOTAL OUTPUT	Imports	Total Supply	Intermediate consumption				HH consumption			Changes in inventories		Export	Total Use	
	Ag. Industry	Manu. Industry				Agricul. Ind. (Feed)	Agricul. Ind. (Seed)	Generation of energy product	Food Processing	Non-food processing	Food	Of which food waste	Other uses	Post-harvest losses			Other changes in inventories
Maize	376		376	1	377	293	1		121	9					-60.08	13.08	377
Maize (processed)	N.A.	132	132	23	155						112	9	11	13.08	9.92	155	

- Total output (Manu. Industry) = 132
- Total supply (maize processed) = Total output + imports
= 132 + 23 = 155



Household consumption of maize (processed)

SUPPLY

USE

Product	OUTPUT		TOTAL OUTPUT	Imports	Total Supply	Intermediate consumption				HH consumption			Changes in inventories		Export	Total Use	
	Ag. Industry	Manu. Industry				Agricul. Ind. (Feed)	Agricul. Ind. (Seed)	Generation of energy product	Food Processing	Non-food processing	Food	Of which food waste	Other uses	Post-harvest losses			Other changes in inventories
Maize	376		376	1	377	293	1		121	9					-60.08	13.08	377
Maize (processed)	N.A.	132	132	23	155						112	9	11	13.08	9.92	155	

- Household consumption = Food (including food waste) + Other uses
= 112 + 9 = 121

What could be "other uses" of maize?



Changes in inventories and exports of maize (processed)

SUPPLY

USE

Product	OUTPUT		TOTAL OUTPUT	Imports	Total Supply	Intermediate consumption					HH consumption			Changes in inventories		Export	Total Use
	Ag. Industry	Manu. Industry				Agricul. Ind. (Feed)	Agricul. Ind. (Seed)	Generation of energy product	Food Processing	Non-food processing	Food	Of which food waste	Other uses	Post-harvest losses	Other changes in inventories		
Maize	376		376	1	377	293	1		121	9					-60.08	13.08	377
Maize (processed)	N.A.	132	132	23	155					112		9	11	13.08	9.92	155	

- **Changes in inventories** = post-harvest losses + other changes in inventories
(= 11 + 13.08 = 24.08)
 - 13.08 tonnes were put into inventory
- **Exports** = 9.92 tonnes



Total use of maize (processed)

SUPPLY

USE

Product	OUTPUT		TOTAL OUTPUT	Imports	Total Supply	Intermediate consumption					HH consumption			Changes in inventories		Export	Total Use
	Ag. Industry	Manu. Industry				Agricul. Ind. (Feed)	Agricul. Ind. (Seed)	Generation of energy product	Food Processing	Non-food processing	Food	Of which food waste	Other uses	Post-harvest losses	Other changes in inventories		
Maize	376		376	1	377	293	1		121	9					-60.08	13.08	377
Maize (processed)	N.A.	132	132	23	155					112		9	11	13.08	9.92	155	

- **Total use** = Intermediate consumption + HH consumption + Changes in inventories + Exports
= 0 + 121 + 24.08 + 9.92 = 155
- **Total use = Total supply!**

Where did 121 and 24.08 come from?



Selection of crops

- The scope of this physical flow table is **all crops**
- SEEA AFF suggests that each country develops physical flow accounts for crops that focus on eight to ten **most important crops**
- Selection is not straightforward
 - Could base on volume, value or environmental impact
 - Other policy priorities (food security, nutrition, etc.)?

Who is the most appropriate actor to do this selection? (NSO, Agriculture, Finance, Environment...)

Product	SUPPLY				USE										
	Ag.	Indus.	Manu.	Industry	TOTAL SUPPLY	Intermediate consumption	Final consumption	Change in inventories	Other	Exports	Imports	Total Use			
	Ag.	Indus.	Manu.	Industry		Ag.	Indus.	Manu.	Industry	Household	Govt.	Other	Exports	Imports	
Maize	276				276	276									276
Wheat	123				123	123									123

SUPPLY TABLE

Gross

Selected products*

- Maize (raw)
- Maize (processed)
- Rice (raw)
- Rice (processed)
- Wheat (raw)
- Wheat (processed)
- Palm oil (raw)
- Palm oil (processed)
- Sugar (raw)
- Sugar (processed)
- Potatoes (raw)
- Potatoes (processed)
- Fodder (raw)
- Fodder (processed)
- Other food crops (raw)
- Other food crops (processed)
- Other non-food crops (raw)
- Other non-food crops (processed)



The measurement unit

- To record the **raw** and **processed** version of each crop, raw commodity equivalent weight for each processed product will be recorded.
- Raw commodity equivalent for a processed product is the amount of raw commodity required to produce it.

Why is there a difference?

Product	SUPPLY				USE										
	Ag.	Indus.	Manu.	Industry	TOTAL SUPPLY	Intermediate consumption	Final consumption	Change in inventories	Other	Exports	Imports	Total Use			
	Ag.	Indus.	Manu.	Industry		Ag.	Indus.	Manu.	Industry	Household	Govt.	Other	Exports	Imports	
Maize	276				276	276									276
Wheat	123				123	123									123

SUPPLY TABLE

Gross

Selected products*

- Maize (raw)
- Maize (processed)
- Rice (raw)
- Rice (processed)
- Wheat (raw)
- Wheat (processed)
- Palm oil (raw)
- Palm oil (processed)
- Sugar (raw)
- Sugar (processed)
- Potatoes (raw)
- Potatoes (processed)
- Fodder (raw)
- Fodder (processed)
- Other food crops (raw)
- Other food crops (processed)
- Other non-food crops (raw)
- Other non-food crops (processed)



Industry classifications

Product	SUPPLY	USE	Intermediate consumption					Final consumption			Changes in inventories		Total Use				
			Ag. Indus. and Forestry	Manuf. Indus.	Const.	Govt.	Household	Govt.	Household	Other	Final	Other					
Wheat	276	276	276	0	0	0	0	0	0	0	0	0	0	0	0	276	
Wheat (ground)	112	112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	112

- **Agricultural industry** = (ISIC* A) actual harvested production from the field or orchard and gardens, excluding harvesting and threshing losses and that part of crop not harvested for any reason.
- **Manufacturing industry** = (ISIC C) physical or chemical transformation of materials, substances, or components into new products.

* International Standard Industrial Classification of all Economic Activities (ISIC).



Imports and Total supply

Product	SUPPLY	USE	Intermediate consumption					Final consumption			Changes in inventories		Total Use				
			Ag. Indus. and Forestry	Manuf. Indus.	Const.	Govt.	Household	Govt.	Household	Other	Final	Other					
Wheat	276	276	276	0	0	0	0	0	0	0	0	0	0	0	0	276	
Wheat (ground)	112	112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	112

- **Imports** = the purchase, barter or receipt of crop products by resident from non-resident.
- There are various ways of defining **supply** and, in fact, various concepts are in use (production + imports - exports + changes in stocks)
 - **Total supply of raw commodities** = agricultural industry output + imports
 - **Total supply of processed products** = manufacturing industry output + imports



Intermediate consumption

Product	SUNY	TOTAL	Total Supply	Intermediate consumption				Non-Consumption			Changes in inventories		Total Use	
				Ag. Industries	Man. Industries	Construction	Other	Food	Non-food	Food waste	Other	Food		Other
Wheat	276	276	276	276	0	0	0	0	0	0	0	0	0	276
Wheat (ground)	112	112	112	112	0	0	0	0	0	0	0	0	0	112

- **Feed** = quantity of product used for feeding livestock and poultry during the reference period. The quantities are assumed to be **raw**.
- **Seed** = quantity of product used for sowing or planting. The entry also includes quantities used for sowing or planting crops harvested for fodder.
- **Generation of Energy Products** = raw product used for the generation of energy products such as fuel, heat or electricity
- **Food Processing** = raw products used by economic units for physical or chemical transformation into food and beverage products
- **Non-Food Processing** = raw product used by economic unit for the processing of non-food products



Household consumption

Product	SUNY	TOTAL	Total Supply	Intermediate consumption				Non-Consumption			Changes in inventories		Total Use	
				Ag. Industries	Man. Industries	Construction	Other	Food	Non-food	Food waste	Other	Food		Other
Wheat	276	276	276	276	0	0	0	0	0	0	0	0	0	276
Wheat (ground)	112	112	112	112	0	0	0	0	0	0	0	0	0	112

- **Food consumption** = total quantity of product consumed as food.
 - It includes the product and any product derived from it by further processing
 - It is assumed to be consumed directly from the Agricultural or Manufacturing Industry: **e.g., food from restaurant is not recorded (Why not? Could create another industry for restaurant.)**
- of which **food waste** = amount of household food waste
- **Other uses** = catches all non-food uses of crop production (**Examples?**)



Losses and Changes in inventories

Product	SUPPLY				USE														
	Ag.	Industry	Industry	TOTAL	Intermediate consumption	Household consumption			Government consumption			Exports			Other	Changes in inventories	Total Use		
	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY		
Wheat	276			276	276													48,000.00	276
Wheat (processed)	112	112	112	112														11,000.00	112

- **Post-harvest losses** = quantities of food lost through wastage during the year at all stages between the agricultural output and the final consumption.
- **Other changes in inventories** = changes in the holding of crop products during the reference period at all stages between output and final sale of processed products



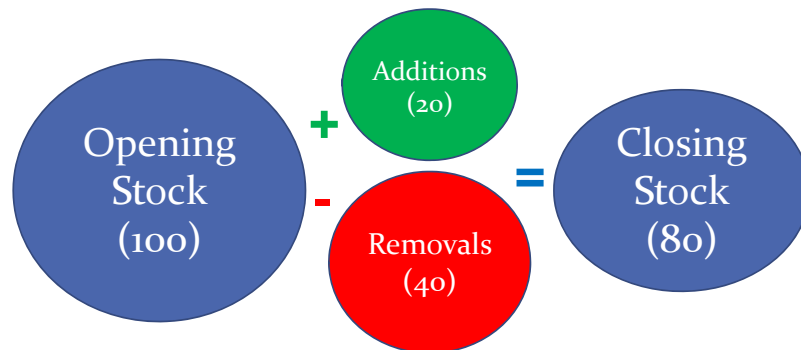
Exports and Total use

Product	SUPPLY				USE														
	Ag.	Industry	Industry	TOTAL	Intermediate consumption	Household consumption			Government consumption			Exports			Other	Changes in inventories	Total Use		
	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY	INDUSTRY		
Wheat	276			276	276													48,000.00	276
Wheat (processed)	112	112	112	112														11,000.00	112

- **Exports** = sale, barter or transfer of crop products by resident to non-resident.
- **Total use** = there are various ways of defining use , involving a number of concepts (Intermediate consumption, HH consumption, exports)
 - Total use for raw commodities = intermediate consumption + HH consumption + changes in inventories + exports
 - Total use for processed commodities = HH consumption + changes in inventories + exports

Asset accounts

- Asset accounts record information on **stocks** of assets at the beginning and end of an accounting period, and **changes** in them during the accounting period.
- The internal consistency of asset accounts is determined by the identity that the opening stock plus additions to stock less reductions in stock must equal the closing stock.



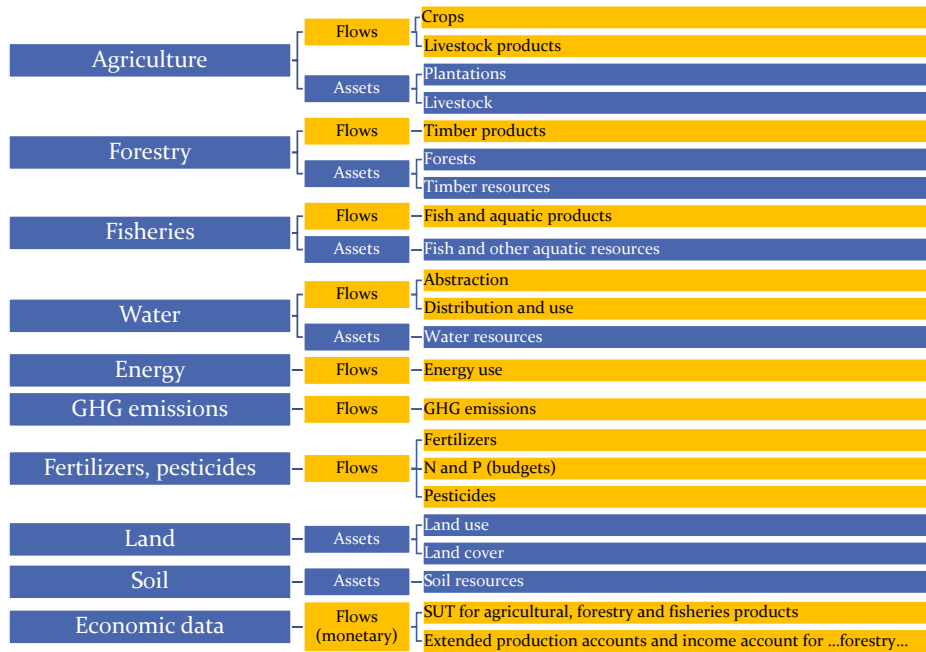
Reasons for additions and removals

- **Additions**
 - Stock can grow
 - You can discover new ones (usually minerals)
 - Could be reclassified or reappraised (e.g., replanting natural forest)
- **Reductions**
 - Stock can be extracted (or harvested)
 - Normal (= natural loss, e.g., disease, fire)
 - Catastrophic loss (unusual, e.g., cyclone damage to trees)

Opening stock of environmental assets
Additions to stock
Growth in stock
Discoveries of new stock
Upward reappraisals
Reclassifications
<i>Total additions of stock</i>
Reductions of stock
Extractions
Normal loss of stock
Catastrophic losses
Downward reappraisals
Reclassifications
<i>Total reductions in stock</i>
Revaluation of the stock*
Closing stock of environmental assets

*Only applicable for asset accounts expressed in monetary terms

Assets in base accounts (the blue parts)



Example: Asset accounts for land use

Reflects:

- Activities undertaken
- Institutional arrangements in a given area for the purposes of **economic production or maintenance and restoration of environmental functions**
- Records opening and closing stock of land in hectares, classified by type of land use and changes in land use over an accounting period through additions to stock and reductions in stock
- **Similar to SEEA-CF Land Use (showing more detail for agriculture)**

Table 4.8: Physical asset account for land use (hectares)

		Opening stock	Additions to stock	Reductions in stock	Net changes in stock	Closing stock
Land use classes						
Land	Land used for agriculture					
	Arable Land					
	Permanent Crop					
	Arable land and permanent crop (tot)					
	Permanent meadows and pasture (cultivated)					
	Permanent meadows and pasture (naturally growing)					
	Permanent meadows and pastures (tot)					
	Total					
	Land used for forestry					
	Land used for aquaculture					
	Use of built up areas					
	Land used for maintenance and restoration of environmental functions					
	Other uses of land nec					
	Land not in use					
	Land area (total)					
Inland waters	Inland waters used for aquaculture or holding facilities					
	Inland waters used for maintenance and restoration of environmental functions					
	Other uses of inland waters nec					
	Inland waters not in use					
	Inland water (Total)					

Example: Asset accounts for land use

- **FAO land use and irrigation questionnaire:**
<http://www.fao.org/economic/ess/ess-home/questionnaires/en/>

CONCEPTS AND DEFINITIONS	
Land use	
6600	Country area, area under the national sovereignty, including its land territory (land area plus inland waters), internal waters and territorial sea, excluding the continental shelf (Article 22, UNCLOS) and exclusive economic zone (Part V, UNCLOS).
6601	Land area is the Country area excluding area under inland water bodies, internal waters and territorial sea.
6610	Agricultural area, this category is the sum of areas under "Arable land and Permanent crops" and "Permanent pastures".

- **SEEA Agriculture land use categories** are described in SEEA Agriculture, Forestry and Fisheries, Section 4.6, p 118-121

Land use		
6600	Country area (1)	(1)=(2)+(26)+(30)
6601	Land area (2)	(2)=(3)+(18)+(20)+(21)
6610	Agricultural area (3)	(3)=(5)+(14)
6611	Agricultural area actually irrigated (4)	(4)=(8)+(10)+(13)+(16)
6620	Arable land and Permanent crops (5)	(5)=(6)+(12)
6621	Arable land (6)	(6)=(7)+(9)+(11)
6630	Temporary crops (7)	
6631	Temporary crops actually irrigated (8)	
6633	Temporary meadows and pastures (9)	
6634	Temporary meadows and pastures actually irrigated (10)	
6640	Fallow land (temporary) (11)	
6650	Permanent crops (12)	
6651	Permanent crops actually irrigated (13)	
6655	Permanent meadows and pastures (14)	(14)=(15)+(17)
6656	Permanent meadows and pastures - Cultivated (15)	
6657	Permanent meadows and pastures - Cultivated and actually irrigated (16)	
6659	Permanent meadows and pastures - Naturally growing (17)	

Group exercise: Asset Account for Land Use

- Work in groups of 3-5 (10 minutes to complete)
- **Need:**
 - Access to internet
- Find and calculate **Asset Account for Land Use (Agricultural Area)** for your country
- Report results for your country

Group exercise: Asset Account for Land Use

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

Choose

COUNTRIES: Country

ELEMENTS: Area

ITEMS: Agricultural area

YEARS: Two most recent years

Report

Opening stock

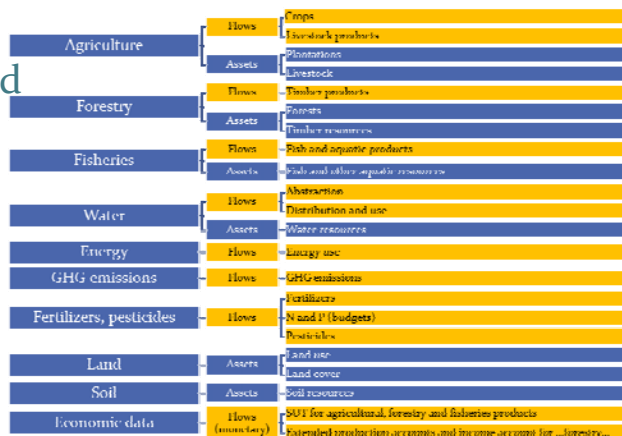
Closing stock

Net change in stock

Other AFF components

• Many aspects not covered in this module:

- Flows of timber, fish products
- Water assets and flows
- Energy flows
- Soil resources
- **GHG Emissions** (AFF more detailed and consistent with UNFCCC reporting tables)

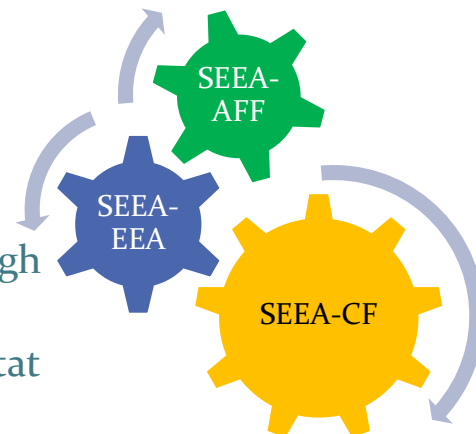


Expansion on SEEA-CF air emissions

- Air emissions and **removals** (reconcile SEEA CF and UNFCCC reporting tables)
 - Linked to ISIC A01:
 - non-CO₂ → IPCC Agriculture
 - CO₂ → IPCC LULUCF cropland and grassland)
 - Land clearing for crop and pasture
 - CO₂ → IPCC LULUCF (forest land converted to other uses)
 - ISIC A02 (forestry)
 - Emissions from tree removal & degradation → CO₂ IPCC LULUCF (forest remaining forest)
 - Biomass fires on managed land → IPCC
 - LULUCF emissions net of removals
 - Accumulation in forest biomass
 - Removals = carbon sequestration as a direct result of economic activity (complement SEEA CF para 5.85 (5.389?)); extend to other physical assets (plus flows between economic units)
 - specific land management practices, including forest re-growth cycles, afforestation, cropland and grassland land set-asides
 - CO₂ → IPCC sector LULUCF cropland, grassland, forestland and land converted to other uses
 - Excludes emissions from natural processes (e.g., CO₂ fertilization and nitrogen deposition) (SEEA CF 3.242)

Take home points

- SEEA Agriculture, Forestry and Fisheries adds important detail and clarifications to SEEA-CF
- It links existing FAO data through SEEA accounting concepts
- Data already available on FAOStat can be used produce Tier I accounts to validate national data



Acknowledgements

Prepared by

- Michael Bordt, ESCAP Regional Adviser on Environment Statistics, bordt@un.org

Adapted from

- Silvia Cerilli and Francesco N. Tubiello, Statistic Division, FAO. 2015. SEEA-Agriculture. 21st Meeting of the London Group for Environmental Accounting, 2-4 November 2015, The Hague, The Netherlands. <https://unstats.un.org/unsd/envaccounting/londongroup/meeting21.asp>
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- FAO and World Bank. 2016. First Country application: SEEA AFF Training Workshop in Kampala, Uganda on Apr 15-17 2016. <http://www.fao.org/economic/ess/ess-events/envacc/en/>

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- Food and agriculture organization. 2016. System of Environmental-Economic Accounting for Agriculture, Forestry and Fisheries (Draft). https://unstats.un.org/unsd/envaccounting/ceea/meetings/eleventh_meeting/BK-11-3c-2.pdf

Base AFF accounts

Data domain	Kind of account	Base Accounts		
Agriculture	Flows	crops	livestock products	
	Assets	plantations	livestock	
Forestry	Flows	timber products		
	Assets	forests	timber resources	
Fisheries	Flows	fish and aquatic products		
	Assets	fish and other aquatic resources		
Water	Flows	abstraction	distribution and use	
	Assets	water resources		
Energy	Flows	energy use		
GHG Emissions	Flows	GHG emissions		
Fertilizers, pesticides	Flows	fertilizers	N and P (budgets)	pesticides
Land	Assets	land use	land cover	
Soil	Assets	soil resources		
Economic data	Flows (Monetary)	SUT for agricultural, forestry and fisheries products	Extended production accounts and income account for ...forestry...	

Forestry themes

Data domain	Kind of account	Base Accounts		
Agriculture	Flows	crops	livestock products	
	Assets	plantations	livestock	
Forestry	Flows	timber products		
	Assets	forests	timber resources	
Fisheries	Flows	fish and aquatic products		
	Assets	fish and other aquatic resources		
Water	Flows	abstraction	distribution and use	
	Assets	water resources		
Energy	Flows	energy use		
GHG Emissions	Flows	GHG emissions		
Fertilizers, pesticides	Flows	fertilizers	N and P (budgets)	pesticides
Land	Assets	land use	land cover	
Soil	Assets	soil resources		
Economic data	Flows (Monetary)	SUT for agricultural, forestry and fisheries products	Extended production accounts and income account for ... forestry ...	



Timber resources: Linking physical tables

Table 3.7: Physical asset account for timber resources (cubic metres)

Type of timber resource	Opening stock	Additions to stock			Reductions in stock					Net changes in stock	Closing stock					
		Natural growth	Reclassifications	Total additions	Removals	Felling residues	Natural losses	Catastrophic losses	Reclassifications			Total reductions				
Cultivated timber resources	SUPPLY TABLE Product Net annual increment Gross fellings Felling residues (not removed) Removals (over bark) Bark Removals (under bark) Roundwood (under bark) of which Industrial roundwood Wood fuel										Output			Total output	Imports	Total Supply
Natural timber resources											Forestry activity (ISIC 021)	Logging activity (ISIC 022)	Other industries			
Total																

Table 3.5: Physical flow account for timber products (cubic metres)



Monetary supply/use table

Table 3.10 Monetary SU table for Agriculture, Forestry and Fisheries products

SUPPLY table headings		SUPPLY TABLE					Total supply at purchasers prices
		Output	Imports	Trade and transport margins	Taxes on products	less Subsidies on products	
Agriculture, Forestry and Fisheries units		Non-Agriculture, Forestry and Fisheries units					
Total Agriculture							
Forestry products							
Forestry							
Logging							
Other forestry products							
Total Forestry							
Fisheries products							
		Products (row headings)					
USE TABLE		Intermediate consumption	Household consumption	Gross fixed capital formation	Changes in inventories	Exports	Total Use at purchasers prices

Monetary production and income

Table 3.11 Extended production and income account

...								
Total Agriculture								
Forestry and logging								
Forestry								
Logging								
Gathering non-wood forest products								
Support services to forestry								
Total Forestry and logging								
Fisheries								
...								

Output	Intermediate consumption					Gross value added	Compensation of employees	Gross operating surplus & Gross mixed income
	Water	Energy	Fertiliser	Other	Total			
(1)					(2)	(3) = (1)-(2)	(4)	(5) = (3) - (4)

Taxes less subsidies on production and imports	Gross fixed capital formation		Changes in inventories		Consumption of fixed capital (Depreciation)	Employment (000 people)
	Cultivated biological resources	Other produced assets	Cultivated biological resources	Other changes in inventories		
(6)					(7)	(8)

Column headings

Row headings

