

A System of Integrated Economic-Environmental Accounts for Food and Agriculture: Information Paper for the London Group Meeting in Brussels*

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Introduction

The emerging data needs and issues for the 21st century requested by the stakeholders of FAO and documented in the “Final Report of the Independent Evaluation of FAO’s Role and Work in Statistics” are: In addition to maintaining the collection, processing, and dissemination of existing data series, there are increasing demands for new statistics and for integration of data and information to bring a broader body of evidence to bear on issues such as agriculture and environment, climate change, and bio-fuels. The summary table is as follows.

Emerging Data Needs and Issues for the 21st Century

Interviews with Major Users and Partners	Results from Users Survey	Regional and Country Interviews
• Prices	• Prices	• Prices
• Energy/ Bio-fuels	• Energy/ Bio-fuels	• Energy/ Bio-fuels
• Agro-Environmental	• Agro-Environmental	• Agro-Environmental
• Climate Change	• Climate Change	• Climate Change
• Trade	• Trade	• Trade
• Rural (sub-national) Data		• Rural (sub-national) Data
• Water		• Water
• Household Consumption, Food Security		• Household Consumption, Food Security
• Economic Accounts		• Socio-economic data
		• Land/soil (cartography & cadastre)
		• Fishery Statistics

Note: The lists in the table are not in any ranked priority, but as is often the case, views on “emerging” data needs are largely shaped by current data needs.

In his presentation on “Linking Agricultural Statistics to Environment Statistics” (UNCEE/3/13) to the third Meeting of the United Nations Committee of Experts on Environmental-Economic Accounting, 26-27 June 2008, New York, Pieter Everaers of Eurostat called on an “integrated environmental and economic accounting including agricultural accounts.” Issues in his list of “Urgencies” include:

- Deforestation
- Decreasing poverty, increased production
- Rural development, urbanization
- Globalization, trade and rising food prices
- Climate change and disasters
- Endangered species (fish)

* The views expressed in this paper are those of the author and do not necessarily represent those of the FAO or FAO policy.

The list of “Major Requirements for Information” in the “Framework to Develop a Strategic Plan to Improve National and International Agricultural and Rural Statistics” Prepared for the meeting of Experts on Agricultural Statistics, October 22-23, 2008, Washington, DC by Frederic A. Vogel with input from Eurostat, FAO, World Bank, and the USDA are

- National accounts (GDP) – a measure of a nation’s economy as well as the value added by agriculture.
- Development policies – important data needs include indicators to monitor and evaluate the progress of steps taken to encourage development.
- Food security – major inputs are food balances and food production indices.
- Poverty – household and per capita income measures are important as is food consumption.
- Marketing and investment – data on supply and demand of commodities is essential. Measures of investment in capital stock at the farm and rural community level provide an indication of the capacity for future growth as well as the outcome of policy decisions.
- Environment – required information includes the use of fertilizer and other chemicals, disposal of livestock wastes, and management of land subject to erosion.
- Biofuels – quantities by commodity being used to make ethanol or other fuels, plus the by products created and their use.
- Employment including number of workers, number working, days worked, wages and input from family workers
- Global Warming – land cover and land use are important data needs. Also needed are enteric emissions resulting from livestock, especially ruminants.

The statistical data for all these above lists have not been properly yet collected and compiled by countries or FAO, or both. One of the reasons is that there has not been a good system or framework to integrate all of these issues and data together. In the following of this paper, we will show that an expansion of the System of Economic Accounts for Food and Agriculture to an Integrated System of Economic-Environmental Accounts for Food and Agriculture will provide a needed system and framework to meet the statistical needs of emerging issues as listed above by different sources and from various directions and to integrate food and agricultural statistics with each other and into the national statistical system.

Economic Accounts for Food and Agriculture

As part of the missions and programs of FAO, FAO Statistics Division has in its tradition to provide manuals/handbooks on Economic Accounts for Food and Agriculture: *A Handbook of Economic Accounts for Agriculture* (EAA) was released in 1974 in collaboration with United Nations Statistics Division (UNSD) based on the principles and framework of the 1968 *United Nations System of National Accounts* (SNA); and *A System of Economic Accounts for Food and Agriculture* (SEAFA) was published in 1996 following the 1993 SNA.

Both EAA and SEAFA are an application of SNA to the food and agriculture sector. The concepts, definitions, and classifications of accounting units and transactions as well as structures and formats of various accounts of SNA are employed to provide useful guidance for collecting and processing primary data, imputing missing data and observations, and combining and disseminating data from various data sources. In particular, SEAFA provides a broad framework to bring together various kinds of databases relating to food and agriculture, including forestry and fisheries, in an integrated system. It includes details of crop and livestock production and their linkages with the FAO Food Balance Sheet (FBS).

This is necessary for food and agricultural statistics. For the purpose of sector analysis, monitoring, evaluation, and the purpose of policy and decision making, it requires detailed and various aspects of statistical information including the basic needs of human populations for food, fiber, fuel, and shelter coming from a combination of agricultural, fishery, and forestry activities; in addition to crop production, animal husbandry, forestry and fisheries, the availability of food production, the impact of food and agricultural activities on natural resources and the impacts on other sectors. Besides, unlike agriculture, food production is not specifically identified as a single industry in ISIC; rather it cuts across various economic activities covered under agriculture, forestry, fisheries, and manufacturing, such as food processing. Food availability and consumption expressed in both physical quantities of food and in terms of the nutritional level in calories, protein, and fat are important for specific analytical use such as food security. To meet these needs, by treating agriculture as a single sector and lumping all products together as one homogeneous product as in SNA is simply insufficient and not appropriate.

A salient example of the application of EAA and SEAFSA is the long history of compilation of the FBS, which is part of the accounts, for all the FAO member countries. FBS provides comprehensive information on patterns, levels, and trends of national diets. It is the basic tool for the calculation and estimation of the hunger and undernourishment population in each country as well as the total of the world. The FBS consists of data that are considered as the core and foundation of the national agricultural statistical system.

Now after the 1993 SNA has been updated to 1993 SNA Rev.1, it is time for SEAFSA to be reviewed, revised, and expanded. A system of economic-environmental accounts for food and agriculture is a logic extension of the economic accounting for food and agriculture. To extend from the economic accounts for food and agriculture, it provides the continuity with the current food and agricultural statistics, which is crucial for official statistics, especially given that many countries are still facing the challenges in producing basic statistics for food and agriculture due to a lack of capacity or knowledge to do so.

In the next two sections of this short information paper, we would simply touch upon the two questions, namely, why do we need to expand the economic accounts for food and agriculture into Economic and Environmental Accounts for Food and Agriculture (EEAFSA) and how?

Towards Economic-Environmental Accounts for Food and Agriculture

The interaction between agriculture and environment is so pervasive that agricultural production and environmental management are inseparable. On one hand, natural environments are a form of infrastructure and provide a diverse flow of economically valuable inputs that are critical to the agricultural economy such as water, soil, land, pollination of crops and natural vegetation, nutrient cycling, and pest control. On the other hand, agriculture is a producer of ecosystem services, including carbon sequestration and stabilization of the climate, beauty and tourism, habitat for endangered species and other wildlife, purification of air and water, and mitigation of droughts and floods.

The need to provide food security for a growing population is met by more intensive use of land, water resources, irrigation, application of agricultural chemicals, such as fertilizers and pesticides, expansion of cultivation to marginal land that lead to soil erosion and increased deforestation. Agriculture contributes to carbon emissions as forested lands are cleared for cultivation, and fossil fuels are burned to generate more electricity and provide energy for

transportation. Methane from livestock produces much more significantly than carbon dioxide to atmospheric greenhouse gases. Global warming is a result of the “greenhouse” effect caused by the increased concentration of carbon dioxide, methane, and nitrous oxide in the atmosphere. The major contributor to nitrous oxide is the burning of field residue. Carbon emissions can be mitigated by forest land and other plants that absorb carbon dioxide from the atmosphere via photosynthesis and store it as biomass.

By addressing the issues of both economics and environment, the System of Integrated Economic-Environmental Accounts for Food and Agriculture (EEAFA) will meet the challenge of almost all the statistical data needs for the emerging issues we are facing right now: global food insecurity, poverty reduction and related MDGs, the environmental impact of food and bio-energy production, land use statistics, climate change, global warming, and disasters, greenhouse gas emission, production of bio-fuels, the availability and use of water, soil, and land, deforestation, endangered species, sustainable production technologies, rural (sub-regional) development, household consumption, food security, and economic accounts as listed in the “Introduction” section at the beginning of this paper.

These emerging data requirements can be nicely integrated within EEAFA with the core food and agricultural statistics as well as with the national statistical system. For example, the value added by agriculture as part of GDP can be found in national accounts; production, trade, and consumption of food in FBS for food security; household and per capital income in accounts for the household sector for poverty measurement; data on supply and demand of commodities from supply and utilization accounts, balance sheets, and production accounts for marketing and investment; quantities by commodity being used to make ethanol or other fuels, plus the by products created and their use from production accounts, supply and utilization accounts for commodities for bio-fuels; information includes the use of fertilizer and other chemicals, disposal of livestock wastes, and management of land subject to erosion, land cover and land use, enteric emissions resulting from livestock, especially ruminants from environmental accounts for environment and global warming.

The advantage of an accounting system is that it can capture the comprehensive relationship between cross-sector data. In this regard, EEAFA can be the building block for integrating statistics of food, agriculture, and rural with each other as well as integrating them with statistics in other sectors such as health, education, and labor among others and into the national statistical system. Through inter-industry linkages the system provides an economy-wide perspective to show the place and role of agriculture in the total economy. It helps to reveal and fill in the gaps found in the current food and agricultural statistics. With such an economic-environmental accounting framework as the international standard and guidance for data collection, compilation, and analysis, it will ensure meaningful comparison and consistent results across both time and countries. It can be used as a loom on which to weave together the strands spun out by various initiatives of agricultural statistics.

For example, it will integrate the national core statistical needs with those needed to monitor progress towards meeting the MDGs and to meet data requirements for the emerging issues. Monitoring and evaluation indicators and variables, as shown in the “Sourcebook: Tracking Results in Agricultural and Rural Development in Less-than-ideal Conditions” by the World Bank, FAO, and the Global Donor Platform for Rural Development, coming from such a system will have clear roles and places within the overall statistics system. Thus, each of them will not appear to be isolated and the selection of them will not appear to be arbitrary, so that the monitoring and evaluation are integrated with the national statistical system.

Also, in EEAFa farm household is the primary statistical accounting unit. This is contrary to the traditional agricultural economic analysis focusing on commodities and associated factor returns. Most households play a combination of three roles: income generation as a producer, consumption expenditure of a consumer, and the payment of taxes as a taxpayer or the receipt of subsidies. To focus on people, services, resources, rural economies and communities, and the environment, instead of just commodities, is increasingly important as the share of farm household income from non farm sources; and the detailed data about households are important to understand how the forces affecting income and poverty are related to education, health, and the environment, in addition to agriculture. This is the same approach of the study of the rural household income by the Wye City Group. Thus, its progress in this area can be best incorporated and utilized.

Besides, while National Statistical Offices are generally mandated to produce official statistics, it is the ministries of agriculture that generally produce some of the data for agriculture. EEAFa will encourage the dialogue between the two agencies since they will apply the same principles, structure, and systems in data collection, compilation, and dissemination.

Proposed Approaches to Establish Such a System of Integrated Accounts

First, in principle, the revision, update, and expansion of Economic Accounts for Food and Agriculture to Environmental-Economic Accounts for Food and Agriculture should be done by following the principles and structures of the 1993 SNA rev.1 and the SEEA-2003, taking into account of the FAO practice in the collection of various data of food and agriculture. It is a means to promote and implement SEEA-2003. By doing so, it will build EEAFa on the most solid and state-of-the-art bases.

Second, we should explore each of the four SEEA-2003 categories of accounts and follow a module approach. By taking into account environmental factors and elements that are most important and relevant to food and agriculture, and, at the same time, those that are identifiable, valuable, and in some degree measurable as priority, to include them into the economic accounts for food and agriculture one or a few at a time to expand the economic accounts into economic-environmental accounts. For example,

- With the first category of accounts in SEEA-2003 with the purely physical data relating to flows of materials and energy, and the “hybrid” flow accounts combining flow data in both physical and monetary terms, we can consider
 - DEPENDING ON THE ENVIRONMENT: Such as the services provided by the natural environment range from pollination to irrigation to pest control. Farming can be irreparably damaged by the loss of these services.
 - PRECIPITATION AND TEMPERATURE: As global climate change creates shifts in regional patterns of temperature and precipitation, the studies of the effect of seasonal variation in precipitation and temperature on the flows of various services apparently become particularly timely.
- The second category of accounts takes those elements of the existing SNA which are relevant to the good management of the environment and shows how the environment-related transactions can be made more explicit.

- With the third category of accounts in the SEEA that comprises accounts for environmental assets measured in physical and monetary terms, we may have:
 - FARM LAND that is the most important input for agriculture, thus environmental-economic factor. There is rich literature in economics on the analysis of how poverty, population pressures, unstable institutions, and fragile soils together lead to land degradation throughout the developing world.
 - WATER which can often be purchased and deployed separately from land. As water scarcity becomes an increasingly important issue in the drier areas of the world.
 - DEFORESTATION and SOIL EROSION: Agricultural adaptation and use of land have led to land degradation, soil erosion, and widespread deforestation, loss of habitat for many species and consequent loss of biodiversity, and profound changes in significant parts of the earth's surface.
- The final category of SEEA accounts considers how the existing SNA might be adjusted to account for the impact of the economy on the environment.
 - ENVIRONMENTAL POLLUTION: Agriculture is a major source and contributor to numerous environmental pollution and problems, in the form of pesticide toxic, fertilizers, animal wastes, and soil siltation. These pollutants cause contamination of ground and surface waters, and degrade habitat for aquatic organisms including fish.
 - CONTRIBUTING TO THE ENVIRONMENT: Agriculture may reciprocate by contributing to the stability or productivity of the natural environment, as when agricultural crops provide foods for birds or insect populations, carbon sequestration, management of landscape by providing open space and scenery, detoxification and decomposition of wastes.

Third, we should take stock of the agro-environmental indicators developed by international and national agencies in this area, including the areas of farm management and financial resources, agricultural land conservation, soil and water quality, nutrient balance, pesticide use, greenhouse gases, biodiversity and wildlife habitat, landscape, and the agricultural use of water resources; and incorporate them into EEAFA.

The London Group on Environmental Accounts and the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA) are the best forums for sharing experience of developing environmental accounts linked to the economic accounts, and for review, comparison, and discussion of work underway towards development of environmental accounts. During the review, update, and expansion of Economic Accounts for Food and Agriculture, we will keep the London Group and UNCEEA informed of the efforts made by FAO, and to closely consult and invite the experts and specialists of both the London Group and UNCEEA to participate and be involved in the process.

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