Compendium of Agricultural – Environmental Indicators

1989-91 to 2000

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Preface

Much can be revealed about the state of food insecurity and hunger by analysing agricultural-environmental indicators. The Statistics Division has been considering this aspect for quite sometime and publication of the present Compendium is a step in this direction. It brings together data compiled and maintained by the Division to derive agricultural-environmental indicators. The Compendium presents time series of selected indicators in a logical manner to help policy makers in understanding the state of the agri-environment and assist in framing suitable policies.

While working on the Compendium, limitations of available data and occasionally its poor quality are reflected. This has been noted and highlighted. However, as the macro-view has not affected, all available data has been included.

The Compendium has been prepared by Mr. Dominic Ballayan, Statistician and Ms. Giorgia DeSantis, Statistical Clerk under the overall supervision of Mr. Pratap Narain, Senior Officer in the Statistical Analysis Service of the Division. The work was supported by Mr. Mohamed Barre, Statistician, Ms. Amanda Gordon, Statistician and Ms. Giulia Cimino, Statistical Clerk by providing necessary data on external assistance to agriculture, agricultural investment, macro-economic aggregates and fertilizer consumption. The work is being treated as a pilot study at this stage. Comments and suggestions to improve the Compendium may be sent to Mr. Jorge Mernies, Chief, Statistical Analysis Service, Statistics Division.

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Symbols used in the tables

n.a.	Data not available
Ha	Hectare
Kg	Kilogram
US$	United States dollars
MLN US$	Million United States dollars
I$	International dollars
US$/No	United States dollars per total population
LU/Ha	Livestock units per hectare
No/1000Ha	Number of tractors per a thousand hectares

A blank cell means not applicable
Zero value means data below half the unit

1. INTRODUCTION

1.1 Framework

Indicators are statistical constructs which support decision-making by revealing trends in data and subsequently, they can be used to analyse the results of policy actions. In addition, indicators provide an early warning of potential economic, social or environmental damage.

At international level, a systematic effort to bring together the work of various organisations on environmental indicators was made by the Commission of Sustainable Development (CSD). This report brings together data on land, agri-chemicals (fertilizer and pesticides), population, labour force, agricultural machinery, macro-economic aggregates (GDP and investment in agriculture) and development assistance provided for agricultural development in the form of indicators. Some of the indicators included in this compendium have also been recommended by the CSD. However, as the objective of the compendium is to reveal the state of agricultural land, instead of a more comprehensive analysis of the environment in general, it also includes some additional indicators not included in the CSD list. Furthermore, while CSD adopts the "Driving Force – State – Response (DSR)" approach, here the indicators have been grouped according to the "Pressure – State – Response (PSR)" framework in order to study the state of agricultural land. Data included in the Compendium covers 168 countries for selected points in time, viz. average of 1989–1991, average of 1994–1996 and individual years 1998, 1999 and 2000. The data has been used to derive the following indicators:

1. **AGRICULTURAL AREA**
   - 1.1 Agricultural Area/ Total Area
   - 1.2 Arable Land and Permanent Crops/Agricultural Area
   - 1.3 Arable Land /Agricultural Area
   - 1.4 Permanent Crops/Agricultural Area
   - 1.5 Permanent Pastures/Agricultural Area
   - 1.6 Agricultural Labour Force/Agricultural Area
2. **IRRIGATED LAND**
   - 2.1 Irrigated land/Agricultural Area
   - 2.2 Irrigated land/Arable land and Permanent Crops
3. **TRACTORS**
   - 3.1 Tractors/Arable land
4. **PESTICIDES**
   - 4.1 Pesticide consumption/Arable land
   - 4.2 Pesticide consumption/Agricultural Area
5. **FERTILIZER**
   - 5.1 Fertilizer consumption/Arable land
   - 5.2 Fertilizer consumption/Agricultural Area
6. **POPULATION**
   - 6.1 Agricultural Population/Total Population
   - 6.2 Agricultural Labour Force/Total Labour Force
7. **GDP INDICATORS**
   - 7.1 Agricultural GDP /Total GDP
   - 7.2 Agricultural GDP/ Total Labour Force
8. **LIVE ANIMALS – LIVESTOCK**
   - 8.1 Number of Live Animals/Agricultural Area
   - 8.2 Number of Live Animals/Permanent Pastures
9. **VALUE OF AGRICULTURAL PRODUCTION IN INTERNATIONAL DOLLARS**
   - 9.1 Value of Agricultural Production (Int. $)/Agricultural Area
10. **AGRICULTURAL INVESTMENT**
    - 10.1 Agricultural Investment (constant price 1995)/ Agricultural Area
11. **EXTERNAL ASSISTANCE TO AGRICULTURE**
    - 11.1 EAA/Agricultural Area
12. **PRESSURE FOR FOOD PRODUCTION**
    - 12.1 Export Value - Import Value at base year prices for Total Agricultural Production

1.2. Presentation

The Compendium presents indicators for economic groups (developed countries, transition markets and developing countries), continents (Africa, Asia, North and Central America, South America, Europe, Oceania), regional groups of countries (Near East and North Africa, Sub-Saharan Africa, East and South East Asia including China, South Asia, Caribbean, Latin America, and Former USSR) and individual countries. Sections 3 and 4 present economic, continental and regional groups and the breakdown of each indicator by countries respectively. The composition of continents and regional groups is given in Annex 1. Definitions of each data-set are given in Annex 2.

1.3. Analysis of the data included in the Compendium

The basic objective of preparing this Compendium is not to draw any conclusion or analyse the state of the agricultural environment but only to provide basic data to policy makers and analysts. In the past, decision-makers have analysed the economic impact of various programmes and policies without taking into consideration environmental aspects. However, they may like to know the answers to questions such as: (a) What areas need extension support (e.g. use of fertilizer, crop rotation programmes) to improve the quality of land, and what are crop type and farming practices suitable for a region? (b) If the livestock population versus pasture land ratio is suitable for a region and, if not, what changes are required in farming practice for correcting the adverse impact on land? It was noted by the FAO Statistics Division that although agencies like UNEP provide detailed information to review the state of the environment, comprehensive information on agricultural related indicators is not readily available. The information contained in the Compendium is intended to fill this gap, and can be used to study the inter- and intra-regional state of the agricultural environment.

Before looking into the indicators, the nature and limitations of the data should be understood. The indicator series is based on the data compiled by FAO Statistics Division that form a statistical time series starting with the year 1961. The statistics are published in the Production Yearbook and Fertilizer Yearbook and also presented on the FAO website. Some of the basic characteristics of these data-sets are given below:

(i) A leading difficulty faced by the Statistics Division arises from the huge quantity of data required to create a global data-set covering all countries and all items, necessary to undertake global and regional analysis. Not only is there a huge quantity of annual figures relating to various elements to collect or estimate, evaluate and record but also the magnitude of the figures - in terms of units - varies between a few thousands to millions depending upon the country.

(ii) These data are collected in numerous ways, primarily by sending tailored questionnaires to member countries. Other sources are international and national publications, including general yearbooks, agricultural yearbooks, pocket-books, periodicals, FAO Country Representatives' reports, and country visits by ESS statisticians. In some cases, official figures released by the countries can be found in these publications long before they reach FAO through the questionnaires. It is not always easy to ascertain which of the figures reported by the various sources is the most recent or the most reliable, although the national Yearbook data are supposed to be the most accurate. However, they report historical data up to a period of one to three years behind the current year.

(iii) The data are evaluated for consistency within the country and between countries in line with the definitions and coverage of the data recommended by FAO. Furthermore, although there are so many sources of data, it should be noted that most sources deal with the limited data according to their own statistical system. In other words, too much information for certain commodities and too little for others. This results in missing data and gaps in the series. In the absence of any figure from official or unofficial sources, estimates for missing data are made on the basis of various assumptions. However, the estimation of a complete time series, when neither official nor unofficial data are available, presents more difficulties. All these, of course, are the matters which deserve attention and which receive only limited resources.

As an example, the land use classification adopted in this connection is linked to the FAO's recommendations for censuses of agriculture. The FAO land use statistics are more linked to the use of land for agriculture and are historically based on point estimates derived from data collected in periodic agricultural censuses and estimated in intercensual years using a variety of information and data sources. The analysis on data received from countries indicates that the land use definition given by the FAO is not adopted by the majority of countries in collecting and compiling data. Some of the problems countries faced in collection, compilation and presentation of data on land use are given below:

(i) There is no universally accepted concept for some of the items used in the land use classifications. Definitions used by reporting countries vary considerably and items classified under the same category often relate to different kinds of land. Three important points in this connection are as follows:

(a) Most countries define arable land as the land that is potentially cultivable, whereas FAO's definition refers to land under temporary crops, meadow and pasture. This classification also includes fallow land. Fallow land is generally of two types: land that has been left idle in the current crop season to improve the productivity of the land; and land that is left fallow for a longer time period and for which no cultivation activity has been planned. Many countries do not distinguish between these two types of fallow area and count them under arable land.

(b) Area under shifting cultivation presents another problem for collection of data on arable land. This activity can be defined as cultivation involving the removal or burning of vegetation for pasturage or other purposes to support human life. This practice is being done in both fallow areas (which are of a permanent nature) as well as in forest areas. Many countries include this category of land under arable land. Some countries (such as Mali, Niger) also include area under shifting cultivation in the harvested area but exclude it from arable land.

(c) Some countries refer to wooded land as what statistician prefers to call 'woodland'. In most developed countries, animals graze in these areas. Statistically, the areas where animals graze are classified as pasture while those involved in resource assessment classify them (on the basis of satellite imagery) as wooded land. Similarly there are also problems with the classification of area under some plantation crops. For example, should rubber plantations be classified as wooded land or woodland?

(ii) Furthermore, the land use database is not always up-to-date for several reasons. In many countries, there is no established statistical system to generate such data. Gaps have been filled by FAO estimates using other information and assumptions while keeping the time series data reliable. These problems are highlighted to point out that the indicators derived using country data should be seen to reflect the general magnitude of the data rather than an exact measurement. It is possible to compile a more appropriate indicator for each individual country by taking into account their farming customs; however, this has not been attempted as it would present problems in inter-country comparison and aggregation. Therefore, in the present compendium this global data-set has been included without making adjustments for each individual country in order to present an overview of the state of environment.

1.4. Arrangement of the set of indicators

One of the most common examples of describing the use of a set of indicators to provide comprehensive view at a glance is the dashboard of a car, where information on different related factors is put together in one location to provide an overall picture to the user. This suggests that a set of indicators needs to be defined and organised keeping in view the ultimate objective. The present compendium is a step in this direction. It has been organised with the intention of studying the state of the agricultural environment in different regions of the world by looking at agricultural land, a key resource. To analyse 'the state' and understand areas of real concern, regional indicators have been supported by country level information and continental groupings have been further supported by regional groups. A logical framework of the analysis is given below.

A. Pressure Indicators:

Four indicators dealing with production, agricultural production, land and labour have been selected to indicate pressure of agricultural activity on agricultural land.

P.1 Pressure for food and agriculture production for a region has been measured through net export (i.e. export value less import value) of agricultural and food production at base period price. This indicator can be positive or negative depending on the extent of dependence on the rest of the world. Values with a positive sign reveal a comfortable situation for the region. Net product has been divided by total population to compare magnitude of the pressure among regions and countries.

P.2 Agricultural land per agricultural worker (labour force) reveals pressure of economic activity on agricultural land. The smaller the value of the number indicates more pressure on the land.

P.3/4 Both the indicators 'Number of live animals per hectare of permanent pastures' and 'Number of live animals per hectare of agricultural area' presents the livestock–land ratio. Keeping two similar indicators has been considered appropriate as in some of the developing countries livestock also depends on agricultural waste.

B. State Indicators:

Fifteen indicators have been selected to reveal the current and changing state of agricultural land. These indicators highlight: (a) importance of agricultural activity in the country and among the workers (three indicators); (b) distribution of land use (five indicators); (c) use of agri-chemicals and machineries (five indicators); and (d) status of irrigation (two indicators). While studying use of agri-chemicals, indicators have been constructed using arable land as well as total agricultural land keeping in view differences in the agricultural practice in different countries. Similarly, in the case of the status of irrigated land, both agricultural area and area under temporary and permanent crops are used as indicators. Selected indicators are:

S.1 Share of agricultural GDP in total GDP
S.2 Share of population dependent on agriculture in total population
S.3 Share of agricultural labour force in total labour force

S.4 Share of agricultural land in total area
S.5 Share of arable land and land under permanent crops in total agricultural area
S.6 Share of arable land in total agricultural land
S.7 Share of land under permanent crops in the total agricultural land
S.8 Share of land under permanent pastures in the total agricultural land

S.9 Fertilizer consumption per hectare of arable land
S.10 Fertilizer consumption per hectare of agricultural land
S.11 Pesticide consumption per hectare of arable land
S.12 Pesticide consumption per hectare of agricultural land
S.13 Number of tractors used per hectare of arable land