D. Ballayan,

Statistics Division

Food and Agriculture Organization of the United Nations(FAO)

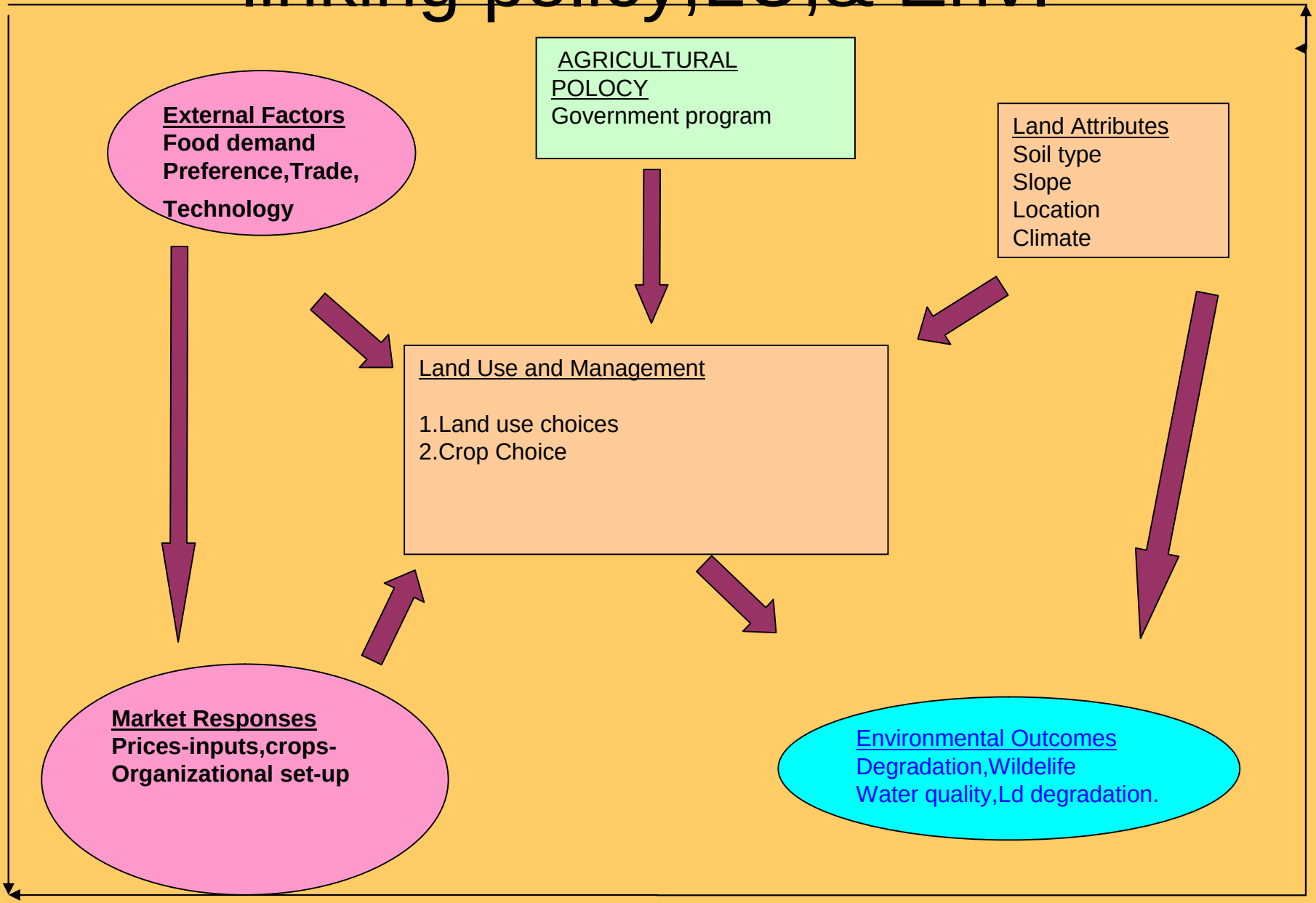
Addis Ababa, 16 July – 20 July 2007

Session 6:Environment and agriculture

The environmental impact of the use of:

- irrigation
- fertilizers
- pesticides
- FAO Forest and Fishery statistics

linking policy,LU,& Env.



linking policy,LU,& Env

- agricultural inputs like irrigation,
- fertilizers,
- pesticides,
- Agricultural machinery,
- and including Land use could provide valuable information of having direct bearing on environmental conditions

Irrigation: Sources of Environmental Impact

The World's Water, Information on the World Freshwater Resources (www.worldwater.org)

Irrigation- Source of Environmental Impact

- water source: ground-water may cause the land to subside, aquifers to become saline, or may accelerate other types of ground-water pollution.
- surface water implies changes to the natural hydrology of rivers and water streams, changes to water temperature, and other alterations to the natural conditions, sometimes deeply affecting the aquatic ecosystems associated with these water bodies.

Irrigation- Source of Environmental Impact

benefit-Irrigated lands contribute significantly to the world agriculture output and food supply.

- alteration of the natural conditions of the landscape
- big dams and reservoirs
- impact on wildlife, particularly endangered species,

benefit-dams and reservoirs are vital for national economic prosperity and agricultural survival.

Environmental impact-from irrigated agriculture

- benefit- higher employment and more rapid agricultural and economic development .

- agriculture contribute to leading source of water quality impairment of rivers and lakes,and third in importance for pollution of estuaries.

Waterlogging

- overuse and/or poor management of irrigation water.
- In addition to problems of waterlogging,salinization, and erosion that affect irrigated areas, the problem of downstream degradation of water quality by salts, agrochemicals and toxic leachates is a serious environmental problem..

Agricultural runoff

- benefit-a key factor behind the increase in agricultural productivity global food production

- source of water pollution is runoff from agriculture.
- Runoff of agricultural chemicals is primarily a localized problem where agricultural input use is high.

United Nations Food and Agricultural Organization, Land and Water Development Division (www.fao.org/ag/AGL

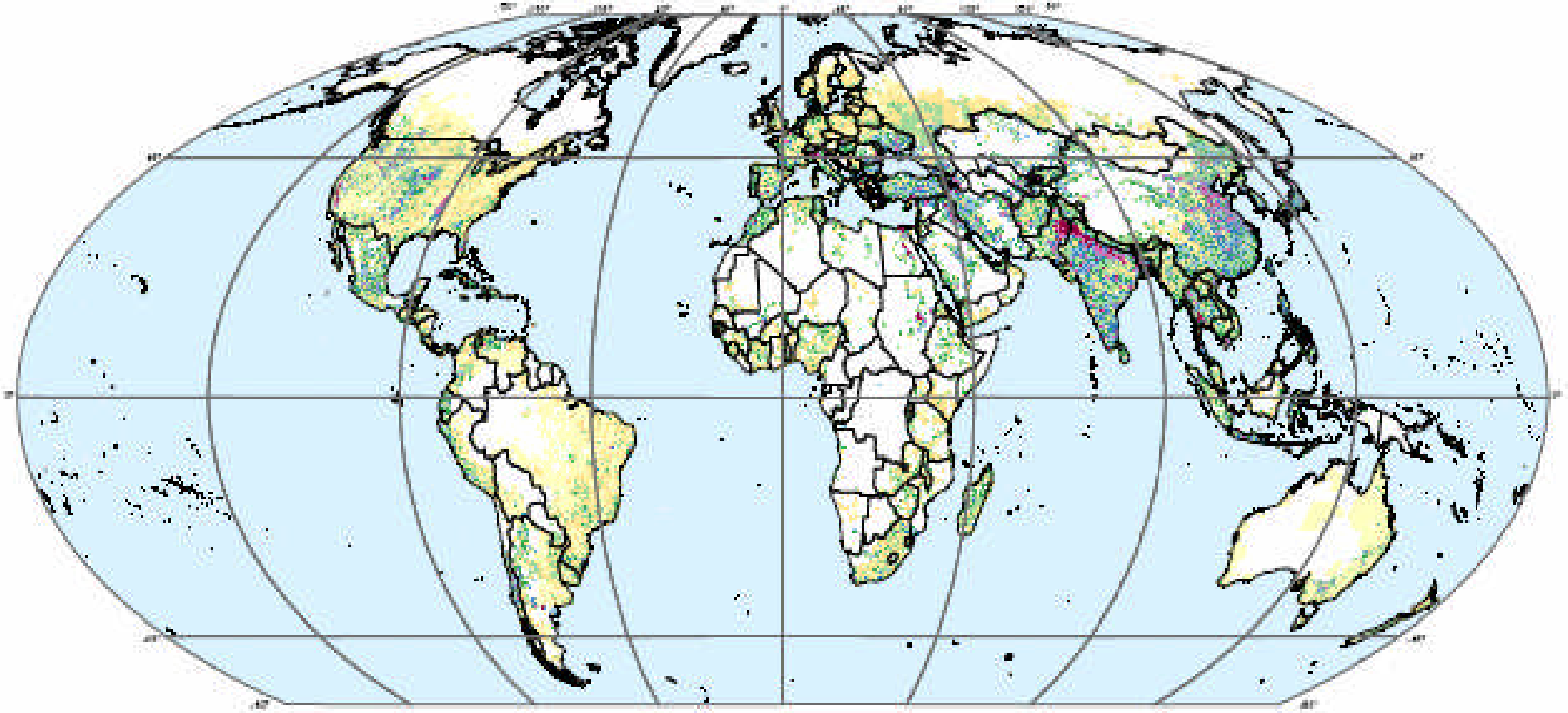
Irrigation
Data Sources

- ***FAO***

  ➢AQUASTAT database (http://www.fao.org/ag/agl/aglw/aquastat/main/index.stm) provides country specific information on the area salinized by irrigation (ha).

The digital global map of irrigation areas

February, 2007



Area under irrigation in percentage of land area

0	10 - 20
<0.1	20 - 35
0.1 - 1	35 - 50
1 - 5	50 - 75
5 - 10	75 - 100

The map depicts the area equipped for irrigation in percentage of cell area.
For the majority of countries the base year of statistics is in the period 1997 - 2002.

Projection: Mollweide

http://www.fao.org/ag/agl/aglw/aquastat/irrigationmap/index.stm

Stefan Siebert, Petra Döll, Sebastian Feick (Institute of Physical Geography, University of Frankfurt/M., Germany) and
Jippe Hoogeveen, Karen Frenken (Land and Water Development Division, Food and Agriculture Organization of the United Nations, Rome, Italy)

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Irrigated Land Use Systems

- This global irrigation map was produced by the University of Frankfurt in cooperation with FAO (Siebert et al., 2007). Irrigated agricultural land comprises less than one-fifth of the total cropped area of the world but produces about two-fifths of the world's food. At the same time, irrigation accounts for about 70 % of the global water withdrawals and for about 90% of the global consumptive water use.

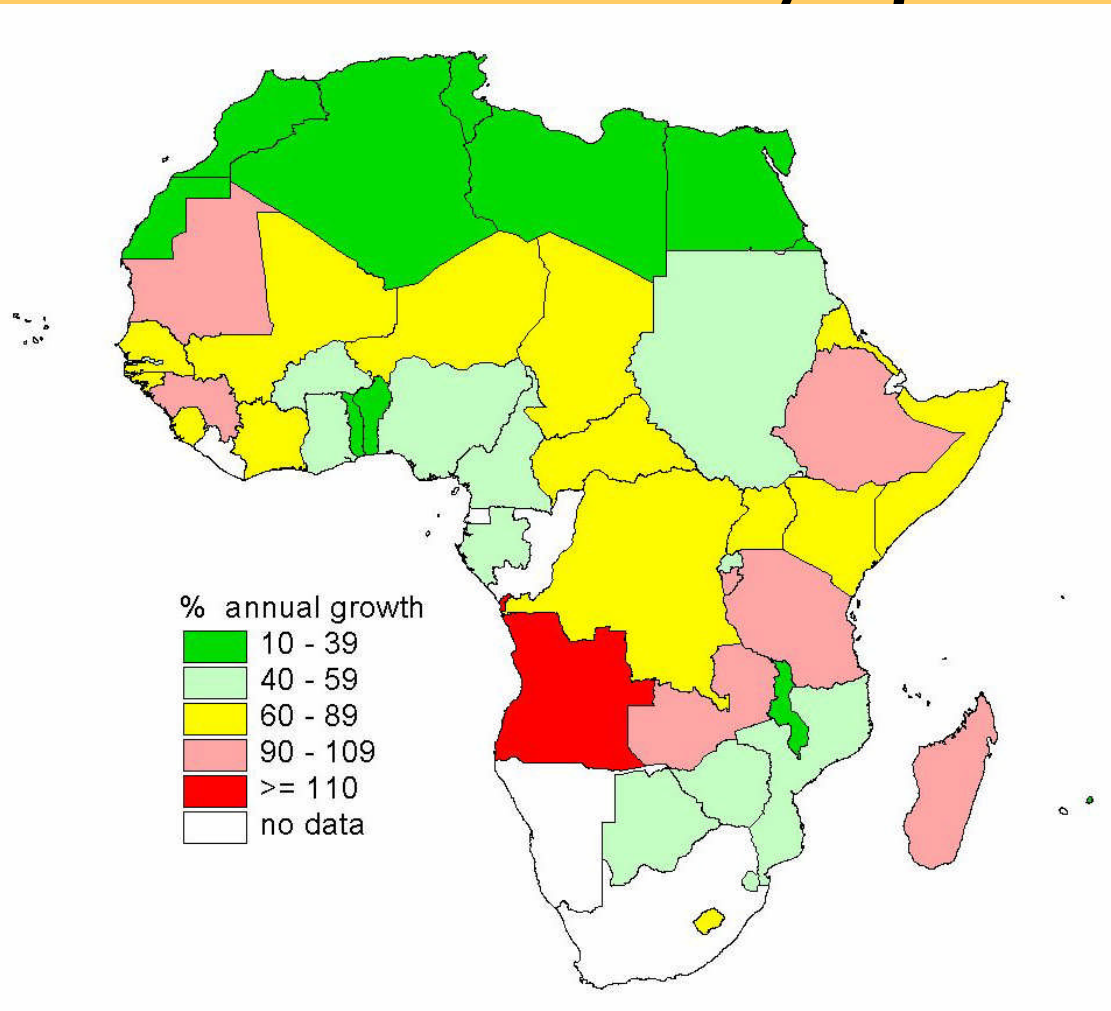
Fertilizer use

- benefit-fertilizer use contribute significantly to the world agriculture output and food supply.

- Plants require nutrients(nitrogen,phosphates and potash) in order to grow, and develop fully to a productive capacity. and complete their life

- Food security
- Improved agricultural productivity

Fertilizer consumption growth for food security goal



Adverse effects on the environment

- run off the land due to heavy rainfall/erosion
- leaching into groundwater
- escape in the form of gas into atmosphere

The results of the above related to inappropriate use of fertilizer to suite and fertile the soil conditions.

DATA SOURCES

- FAO Fertilizer Resource Questionnaire
- OFFICIAL STATISTICAL PUBLICATIONS FOR INDIVIDUAL COUNTRIES;
- UN COMTRADE
- FAO/FERTILIZER INDUSTRY ASSOCIATION MEETINGS

Fertilizer-Data source

- http://faostat.fao.org/site/575/default.aspx
- The Fertilizer module contains summary data for the 2002-2005 period. The fertilizer statistics data is received from countries in fertilizer product format and is converted to nutrient format and summary totals calculated for: Production, Imports, Exports, Non-fertilizer use and Consumption for the straight fertilizers: Nitrogen (N), Phosphates (P205), Potash (K20).

Fertilizer source

- **Fertilizer Links**
- **FAO Plant Production and Protection Division.**
- **FAO Nutrient Response Database (FERTIBASE).**
- **United Nations Commodity Trade Statistics Database (COMTRADE).**
- **European Fertilizer Manufacturers Association.**
- **International Fertilizers Industry.**
- **The Fertilizer Institute.**

Fertilizer-Data source

- National level-Ministry of Agriculture
- **FAO's FertiBase Worldwide:http://faoint0b/landandwater/fertistat/index_en.htm**//This site has been conceived as a means to compile and store statistics on fertilizer use by crop for selected key years and to make them available on-line.
- Clicking on a this site in the map,a dark green country will be displayed with all available statistics on fertilizer use by crop for that very country.
- For a more refined database search, please click the menu item 'Fertilizer Use Statistics'.

Pesticides database

- Pesticide is the generic name for all substances to control organisms detrimental to crop plants. They are commonly classified in two ways: according to target organism (e.g. fungicides, insecticides, herbicides) or according to chemical nature (e.g. organophosphates, parathyroid). The method of data collection followed in the FAO questionnaire relates to target organism.

Pesticides-benefits

- for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animal causing harm during or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and wood products or animal feeding stuffs...etc
- administered to animals for the control of insects, arachnids or other pests in or on their bodies.
- use as a plant growth regulator, defoliant, desiccant, or agent for thinning fruit or preventing the premature fall of fruit,

- increased food security-applied to crops either before or after harvest to protect the commodity from deterioration during storage or transport.

- **Consumption**

PESTICIDES STATISTICS
The FAO database

- For more than three decades FAO has been collecting data on pesticides;
- The information compiled covered consumption/sales quantity used in or sold to the agricultural sector expressed in metric tons of active ingredient;

PESTICIDES STATISTICS
The FAO database

- Information on quantities applied to single crops is not available
- Database on pesticides were presented for major groups and sub-groups(fungicides, insecticides, herbicides,plant growth regulator)

PESTICIDES STATISTICS
The FAO database

- The result was not very encouraging - comprehensive statistics for production, consumption and trade were never available.
- The country coverage and time series were incomplete due to a high rate of non-response

Data availability & Source

- Producers sometimes reluctant to disclose information required for fear that competitors might acquire strategic information.

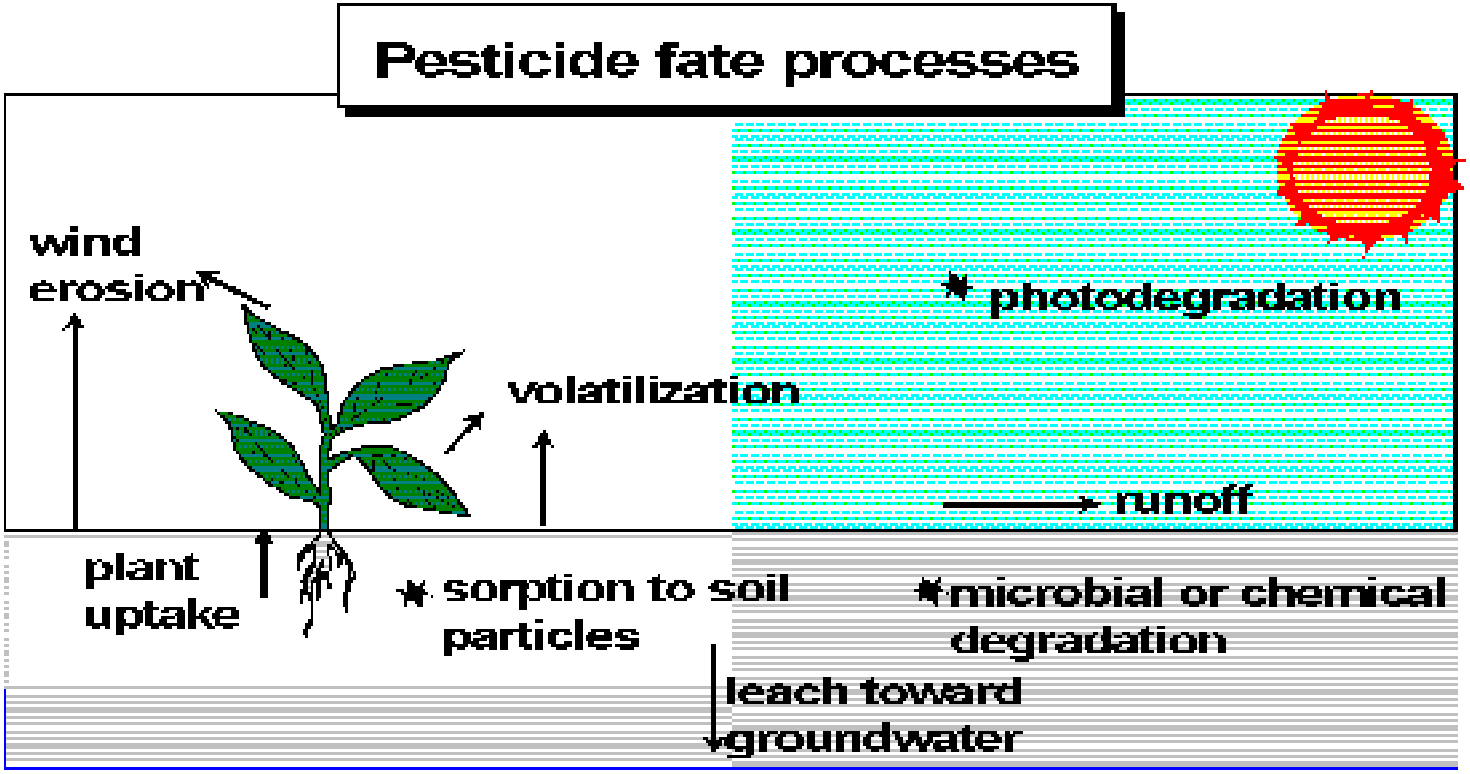
FAO database

.

- A strict inter-country comparison on the basis of the database is not feasible-

- Although countries have been requested to report data in terms of active ingredients, some countries reported in formulation weight (including diluents and adjuvants) without specific indication.

MOVEMENT OF PESTICIDES IN THE ENVIRONMENT



Rotterdam Convention, an international treaty designed to ensure that hazardous chemicals do not endanger human health and the environment.

The Convention requires that hazardous chemicals and pesticides that have been banned ...shall not be exported unless explicitly agreed by the importing country. It also includes pesticide formulations that are too dangerous to be used by farmers in developing countries. Countries are also obliged to stop national production of those hazardous compounds.

The treaty covers a list of 5 industrial chemicals and 22 pesticides, including Aldrin, DDT, Dieldrin, HCH, Lindane, Mercury compounds, Polychlorinated Biphenyls (PCB) and others. Many more are likely to be added in future.

Two more pesticides endosulfan and tributyl - for trade "watch list"

- Widely used around the world, particularly for cotton, endosulfan has been recommended for inclusion on the grounds that is poses unacceptable risks to workers and to the environment. Tributyl tin compounds (TBT), used in anti-fouling paints for ship hulls, are a concern because they enter the marine environment, particularly in enclosed harbours, where they are toxic to fish, molluscs and other organisms.

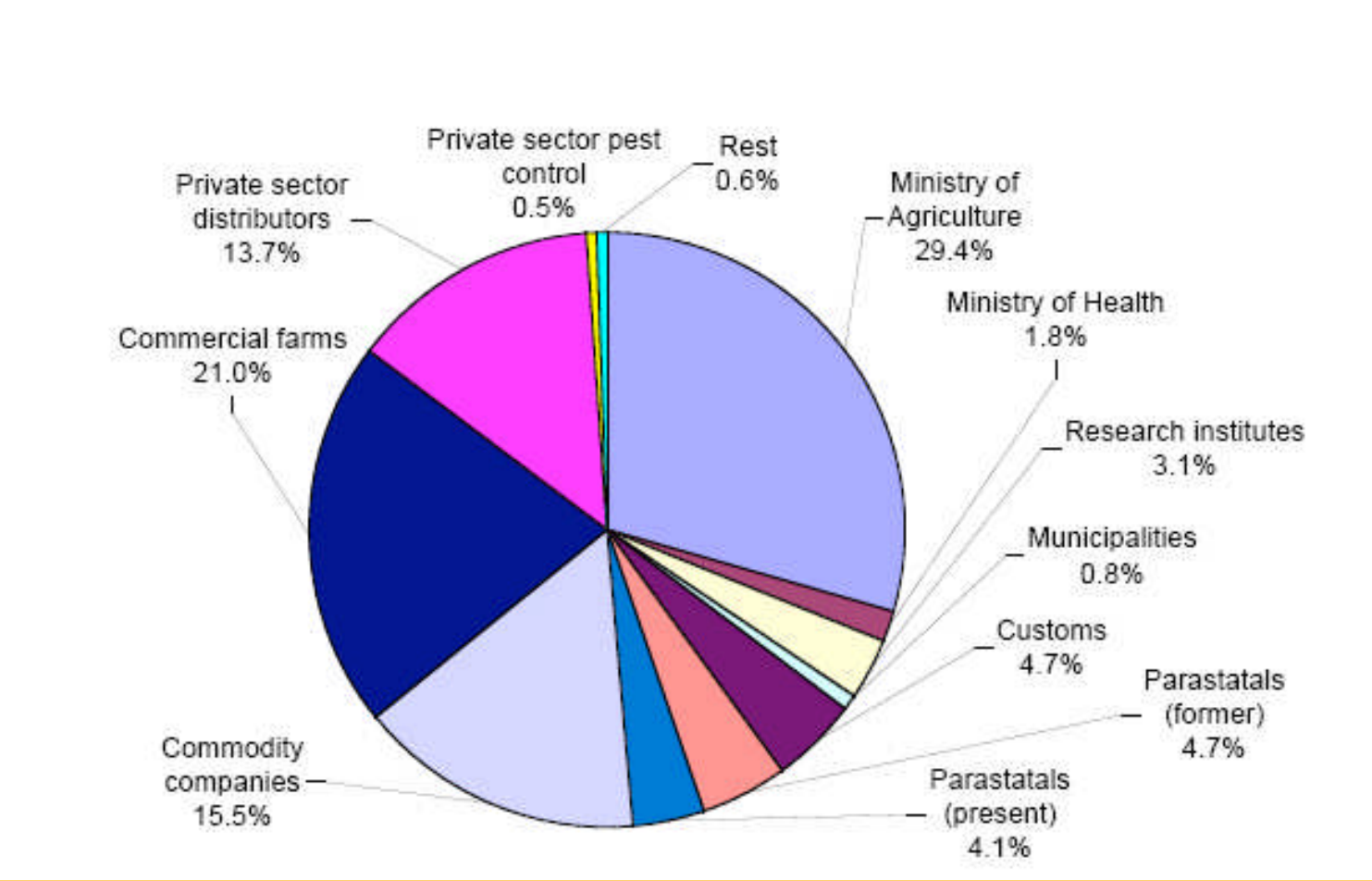
27 March 2007, Rome

PIC Database (HTTP://www.FAO.ORG/PIC)

Local level data source

- Crop Protection Department/MOA
- databases show that a total of 1627 tons of obsolete pesticides were identified, and subsequently disposed of,
-

obsolete pesticides by owner



FAO database

- In 2002, suspended the data collection why undertaking a study for a new dimension

What information is needed?

- Sales database

  - how many kilograms are sold of each compound allowed on the market?
- Usage database

  - what is the distribution of 1 compound over the crops?

  - which part of the compound is used as a granules or as a spray?

  - which part of the compound is used in glasshouses or in the field?

  - What is the average application rate of a compound for a particular crop?

  - (which crop is grown in which part of your research object?)

What information is needed?

- Compound related database
  - Toxicity values
  - information on degradation
- GIS database (e.g. OM%, pH, slope, soil type, etc.)

- **Possible layout of FAO indicators**

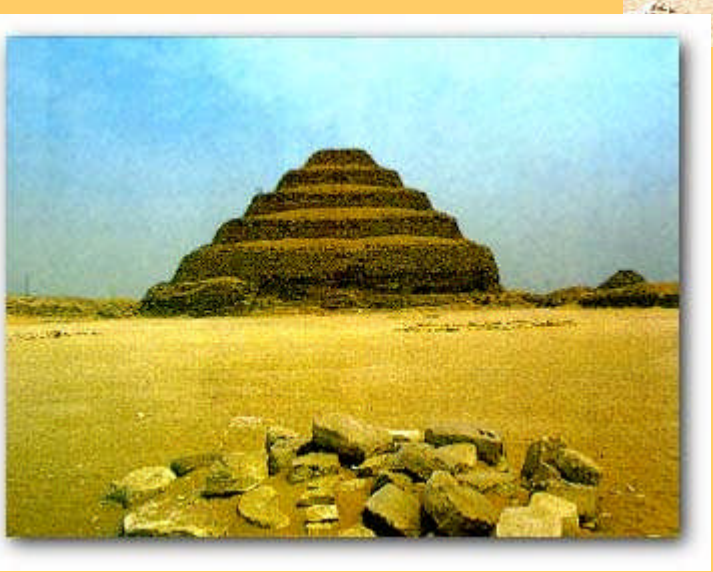
Harmonised environmental Indicators for pesticide Risk

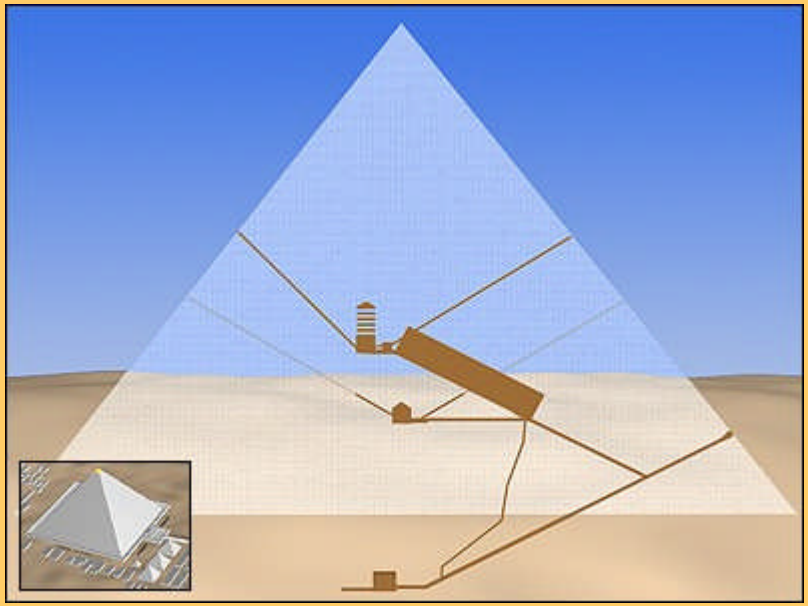
Harmonised environmental Indicators

for pesticide Risk

Policy makers

Scientists





FAO Fisheries Statistics

FAO Fisheries Statistics

Global production	1950-	volume (live-wt)	Q	F		A
Capture production	1950-	volume (live-wt)	Q	F	Y	
Aquaculture production	1950-	value and volume (live-wt)	Q	F	Y	
Trade and commodities	1976-	value and volume of commodities		F	Y	A*
Consumption and Food balance Sheets	1961-	per capita consumption			O	A
Fishers	1970-	# fishers			O	
Fishing fleets	1970-1998	# vessels	Q		O	

- Available at on-line query – Q; through FishStat Plus – F;
- Publication: yearbook – Y; occasional publication – O;
- Available through FAOSTAT – A, but only in aggregated form; A*- historically available but not available now due to change in definition in FAOSTAT

Other information available in the FAO Fisheries web-site

- Guideline for data/statistics collection and glossary;
  - CWP Handbook of Fishery Statistical Standards, Fisheries Glossary,
  - Glossary of Aquaculture,
- Biological information;
  - ASFIS Species List, Species distribution maps, Reference Tables
  - Management System, FishBase
- Geographic Information;
  - The SADC Water Resource Database (WRD)
- Resource and Management Information;
  - Fishery Resource Monitoring System (FIRMS), Link to all Regional
  - Fishery Bodies,
- General;
  - Aquatic Sciences and Fisheries Abstract (ASFA)

- **“The State of World Fisheries and Aquaculture”**

FAO proposal of modification of WCO HS codes

- Objectives of proposal for fishery:
  - Improved monitoring consumption and utilization of fish and fishery products.
  - Improved monitoring capacity of capture and aquaculture production
  - Inputs to socio-economic analysis.
- Major points of proposed modifications:
  - Separation of capture and aquaculture origins for salmons and shrimps
  - Inclusion of fish used as seeds for culture, e.g. fry and eggs
  - Addition of several small pelagics, e.g. jack and horse mackerel, anchovies
  - Addition of new important fresh water species, e.g. Tilapias, Nile perch, catfish, carps

Web addresses

- FI top page: http://www.fao.org/fi/website/FIRetrieveAction.do?dom=topic&fid=16000
- FI statistics page: http://www.fao.org/fi/website/FIRetrieveAction.do?dom=topic&fid=16003
- FI Glossary; http://www.fao.org/fi/website/FIRetrieveAction.do?dom=topic&fid=16008
- Any questions? mail to FIES-Inquiries@fao.org

FAO Global Forest Resources Database

T1 Forest area

FRA 2010 categories	Area (1000 hectares)			
	1990	2000	2005	2010
Forest				
Other wooded land				
Other land				
...of which with tree cover				
Inland water bodies				
Total for country				

Forest

Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.

Other wooded land

Land not classified as “Forest”, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.

Other land with tree cover

Land classified as “Other land”, spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity.

(i.e. the same cover criteria as forest, but different land use criteria (primary land use is agriculture, horticulture or urban (parks))

Global Forest Resources Assessment 2005

Progress towards sustainable forest management

FAO FORESTRY PAPER

147

Global Forest Resources Assessment 2005

Progress towards sustainable forest management

FAO FORESTRY PAPER

147

40

VARIABLES

229

COUNTRIES AND TERRITORIES

1990

2000

2005

SUCCESS FACTORS

TREMENDOUS COUNTRY INVOLVEMENT

172 NATIONAL CORRESPONDENTS

>800 PROFESSIONALS INVOLVED

229 COUNTRY REPORTS

AGREED TERMS AND DEFINITIONS

TRANSPARENCY

www.fao.org/forestry/fra2005

What is land degradation ?

salinization

salinization

rangeland degradation

sand dune encroachment

loss of biodiversity

outmigration

What is land degradation ?

Degraded land

Land which due to natural processes or human activity is no longer able to sustain properly an economic function and/or the original ecological function (ISO, 1996)

Vegetation degradation

Implies reduction in biomass, decrease in species diversity, or decline in quality in terms of the nutritional value for livestock and wildlife (Eswaran et al, 2000)

What is land degradation ?

"Soil" degradation

Decline in soil qualities commonly caused through improper use by humans (ISSS, 1996). This includes physical, chemical and/or biological deterioration.

- loss of organic matter; decline in soil fertility,
- decline in structural conditions; erosion
- adverse changes in salinity, acidity or alkalinity
- the effects of toxic chemicals, pollutants or excessive flooding

What is land degradation ?

.... encompasses the whole environment but includes individual factors

- **Soils**
- **Water resources** *(surface, ground)*
- **Forests** *(woodlands)*
- **Grasslands** *(rangelands)*
- **Croplands** *(rainfed, irrigated)*
- **Biodiversity** *(animal, vegetative cover, soil)*

The Land Degradation Assessment in Drylands (LADA)

- A UN initiative executed by

  FAO and supported by the Global Environment Facility (GEF), UNEP, the Secretariat and the Global Mechanism of the UNCCD and FAO.
- (http://lada.virtualcentre.org/
- (http://www.fao.org/ag/agl/agll/lada/pilot.stm)

Major outputs of the LADA project

- standardized methodological framework for the assessment of degradation status, risk and causes,
- a baseline map of dryland degradation at subregional scale based on the collection and collation of existing maps and databases
- degradation hazards, and a detailed assessment of land degradation at national level focusing on areas at great risk and areas where degradation has been reversed

Data Sources

- FAO Website:(http://www.fao.org/landandwater/agll/glasod/glasodmaps.jsp) information derived from GLASOD survey covers degradation data.
- the severity of degradation classified into four classes: light, moderate, severe and very severe
- the original GLASOD survey calls these classes low, medium, high and very high
- more information also contain in the Terrastat.CD-ROM

For more information ....

http://lada.virtualcentre.org/pagedisplay/display.asp

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Viale delle Terme di Caracalla
00100 Rome, Italy
Fax: +39 06570 56275
Phone: +39 06570 53843

http://www.fao.org/ag/agl/agll/lada/default.stm

Thanks

- The end

Land use classes

- **LCCS as the starting point. Transformation to land use classes:**

- Forest
- Other wooded land
- Other land with tree cover
- Grassland/range/herbaceous
- Agricultural crops
- Built-up area
- Other non-vegetated areas
- Water
- No data

- http://www.fao.org/es/ess/census/default.asp

- The latest World Programme for the Census of Agriculture (WCA 2010), presented in the publication *"A System of Integrated Agricultural Censuses and Surveys, Volume 1, World Programme for the Census of Agriculture 2010"*, (SDS No. 11) provides countries with a flexible approach to the collection of structural agricultural data on a variety of subjects.

World Census of Agriculture - Results by country

- Results by country are aimed at disseminating main National Agricultural Census Results referring to the 1980, 1990 and 2000 rounds. Relevant information about Number, Size and Fragmentation of Holding, Legal Status of Holders, Land Tenure, Farm Population, Employment, Land Use, main Crops and main Livestock species is reported.
- The purpose of issuing the census results is to make the census data contained in national census reports of diverse forms and languages more accessible in a comparable form, as soon as they become available. Generally the terminology used is that of the Programme for the WCA, unless it was found necessary to use the one adopted by the country.
- The country data, as presented here, are the principal findings of the census; more detailed information could be found in the national census reports; specific questions can be addressed to the National Statistical Offices responsible for census taking and data publication whose addresses and web-site pages are reported (these links are provided for users convenience; FAO is not responsible for the information found through them).
- Due to the specific statistical methodologies applied, users may find some differences between the figures here reported and related data from other time series databases. In addition to the data, explanatory notes about the census methodology of each country is provided, which may be useful for understanding and interpreting the results.

- **World Census of Agriculture**
- Updated 25-05-2007
- **1980 Round 1990 Round 2000 Round**

Environmental conventions

- **The Convention on Wetlands (Ramsar Convention), 1971**
  - Programs to conserve and use wisely all wetlands; 137 Parties;
- **Convention on International Trade in Endangered Species of Wild Fauna and Flora, CITES 1975**
  - To safeguard species from over exploitation; 164 parties; Appropriate wildlife management & trade policies
- **Convention on Biological Diversity, CBD 1992**
  - 187 Parties; biodiversity conservation
- **UN Framework Convention on Climate Change, 1992**
- **Kyoto Protocol (joint implementation, CDM, emissions trading)**
- **UN Convention to Combat Desertification, UNCCD, 1994**
  - Programs to reduce degradation of land in arid, semi-arid and dry sub-humid areas; 166 Parties;

- Data collected on agricultural inputs like irrigation, fertilizers, pesticides Agricultural machinery and including Land use could provide valuable information having direct bearing on environmental conditions. The use of fertilizer is a direct activity in agriculture with pressure on the environment. Therefore utilizing the data collected on fertilizers in terms of nutrients would be useful information for environmental studies and analysis

- Information on fertilizer use by crops at farm level is needed by agricultural researchers, institutions and the countries for assessing country requirements for fertilizer, fixing targets for crop production and supporting other advisory and research activities for agricultural development. Such information is useful for designing fertilizer policies and programmes and targeting investment for food security and environmental protection.
- The data collection will involve statistics on fertilizer use by individual crops, area fertilized, application rates, total amount of nutrient used, yield, etc

- This is a very important area for providing a picture of the structure of agricultural production and its contribution to the general economy. The value of fertilizer trade data therefore play essential role in this respect. If feasible, it could also be useful to value the fertilizer consumption in US dollars and in nutrient terms using data on imports and exports of fertilizer traded and total quantity of fertilizer consumed per country