SUSTAINABLE AGRO-FOOD PRODUCTION-ENERGY-CLIMATE CHANGE

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The word SUSTAINABLE is used in several combinations such as:

Sustainable economy

Sustainable society

Sustainable use

Sustainable development

The World Commission on Environment and Development

(WCED)

defined "SUSTAINABLE DEVELOPMENT"

as

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs"

There has been a confusion because

"Sustainable Development",

"Sustainable Growth" and "Sustainable Use"

have been used as if their meanings

were the same.

THEY ARE NOT

"Sustainable Growth" is not correct ;

NOTHING IN NATURE CAN GROW INDEFINITELY.

" Sustainable Use" has meaning only for

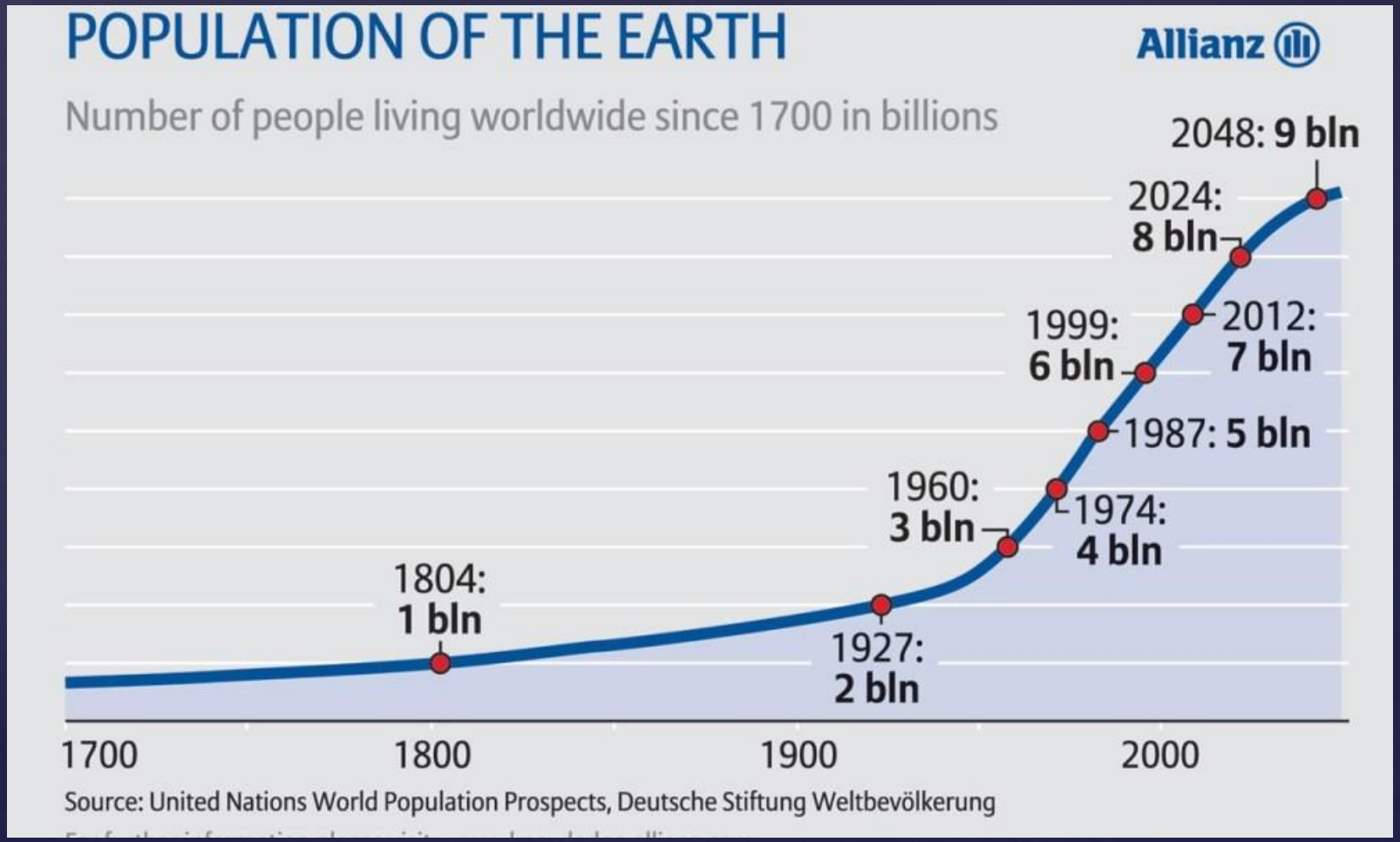
RENEWABLE RESOURCES

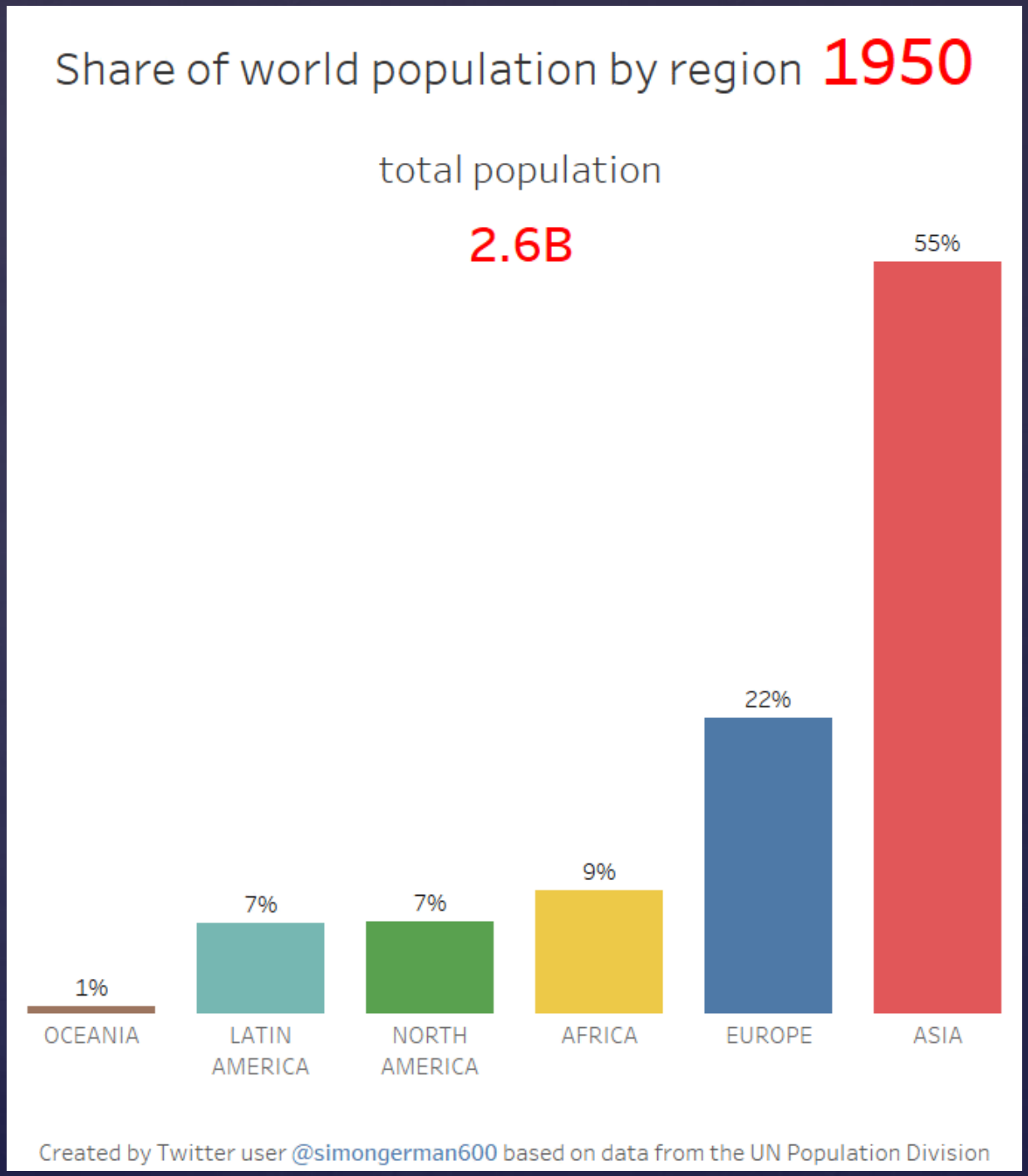
Since we must use them at rates within their capacity for renewal

For NON-RENEWABLE RESOURCES the correct term is "WISE or SENSIBLE USE"

Earth is at risk: we are misusing natural resources and disturbing natural systems. We are pressing Earth to the limits of its capacity.

- Since the industrial revolution till today, population has risen more than eight times.




Share of world population by region 1950
total population
2.6B
55%
22%
9%
7%
7%
1%
OCEANIA
LATIN AMERICA
NORTH AMERICA
AFRICA
EUROPE
ASIA
Created by Twitter user @simongerman600 based on data from the UN Population Division

- Industrial production has increased more than 100 times in the past 100 years.
- In less than 200 years the planet has lost 6 million square kilometers of forest.
- Water withdrawals have grown from 100 to over 4000 cubic kilometers per year.
- More than half of the wetlands have been dried.
- Thousands of new synthetic chemical compounds are produced every year.
- Most of all, energy consumption has risen dramatically leading to exhaustion of fossil fuels.

Some results of the above mentioned facts are:

- ✓ SOIL EROSION
- ✓ LAND DESERTIFICATION
- ✓ ACCUMULATION OF VAST AMOUNTS OF SOLID WASTE
- ✓ GREAT LOSSES OF FLORA AND FAUNA SPECIES
- ✓ UNDERGROUND WATER SALINIZATION
- ✓ POLLUTION OF AIR, SOIL, FRESH WATERS AND OCEANS
- ✓ ALTERING THE COMPOSITION OF THE ATMOSPHERE (e.g. increase of Carbon Dioxide concentration by 27%; disturbance of the stratospheric ozone layer)

Living sustainably and caring for the EARTH
must be a major target for most people

The EARTH has its limits

Some principles must be taken under consideration

The Principles are:

- ✓ **Respect and care for life**
- ✓ **Improve the quality of human life**
- ✓ **Conserve the Earth's vitality and diversity**
- ✓ **Minimize the depletion of non-renewable resources**
- ✓ **Keep within the Earth's carrying capacity**
- ✓ **Change personal attitudes and practices**
- ✓ **Enable communities to care for their own environments**
- ✓ **Provide a national framework for integrating development and conservation**
- ✓ **Create a global alliance**

Conserve the Earth's vitality and diversity

The Earth is continually changing,
conservation must maintain the capacity of ecosystems
and the human communities that depend on them must adapt.

This is a matter of:

- Conserving the life-support systems that nature provides
- Conserving the diversity of life on Earth
- Ensuring that all uses of renewable resources are sustainable

Life-support systems are the ecological processes that
SHAPE CLIMATE,
Cleanse air and water , Regulate water flow,
Recycle essential elements, Create and Regenerate soil,
and Keep the planet fit for life.

Human activities alter these processes through Global Pollution and Destruction or Modification of Ecosystems.

GREENHOUSE gases are produced

by Burning Fossil Fuels, Clearing Forests,

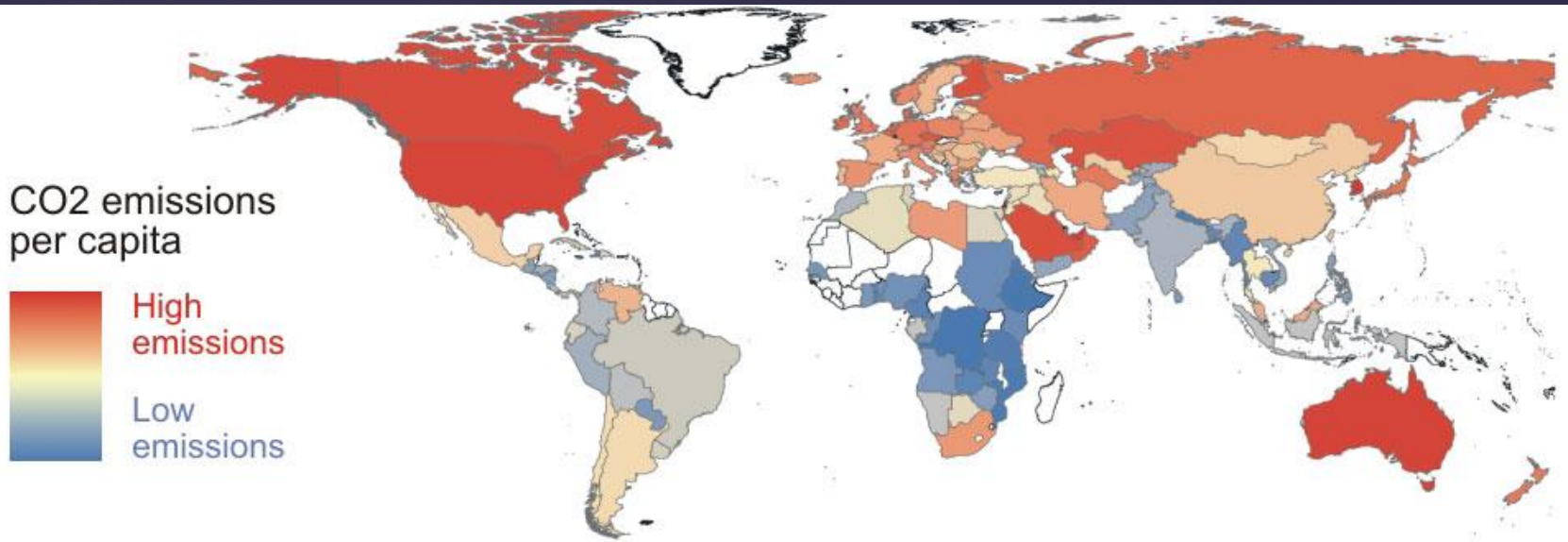
and Raising CROPS and LIVESTOCK,

are accumulating in the atmosphere,

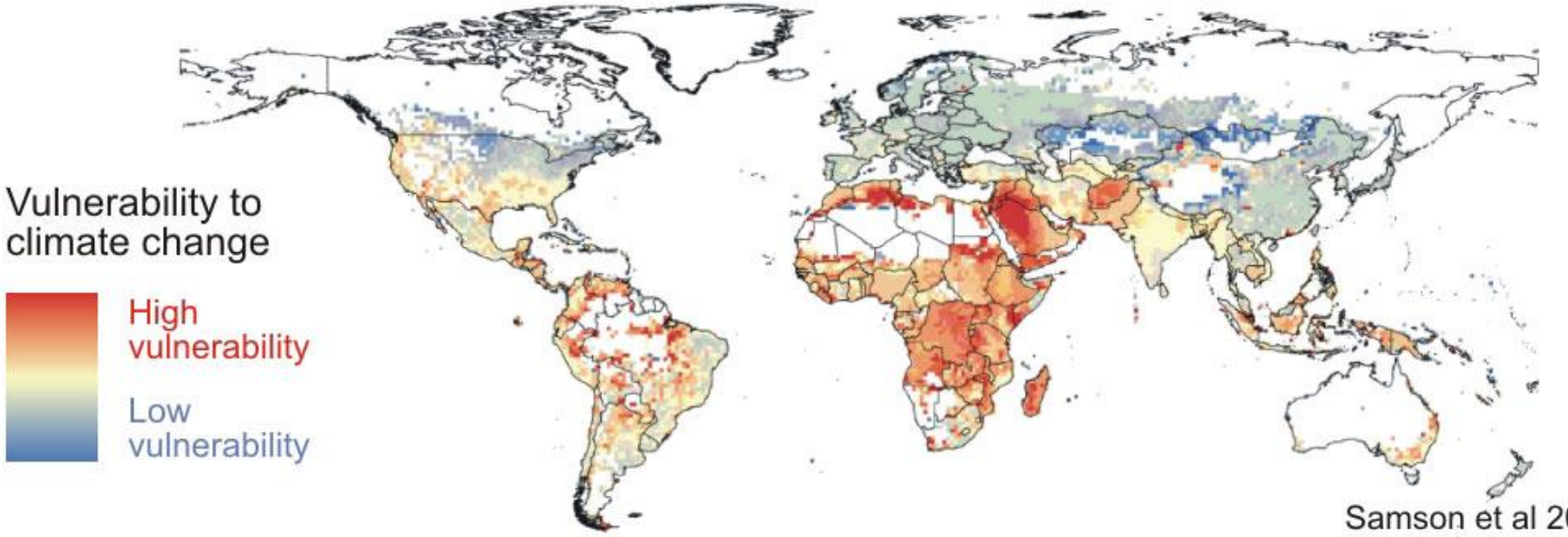
intensifying its heat-trapping properties.

If present trends continue and
if current models of Earth's Climate are correct,
the average temperature of the planet
is expected to increase by 3°C before the end of the century.

THE RESULTS WILL BE:
Shift of climate regions, Change of precipitation patterns,
Rise of sea-levels,
and Increase in frequency and intensity of droughts and storms.



Those who contribute the least greenhouse gases
will be most impacted by climate change



Samson et al 2011

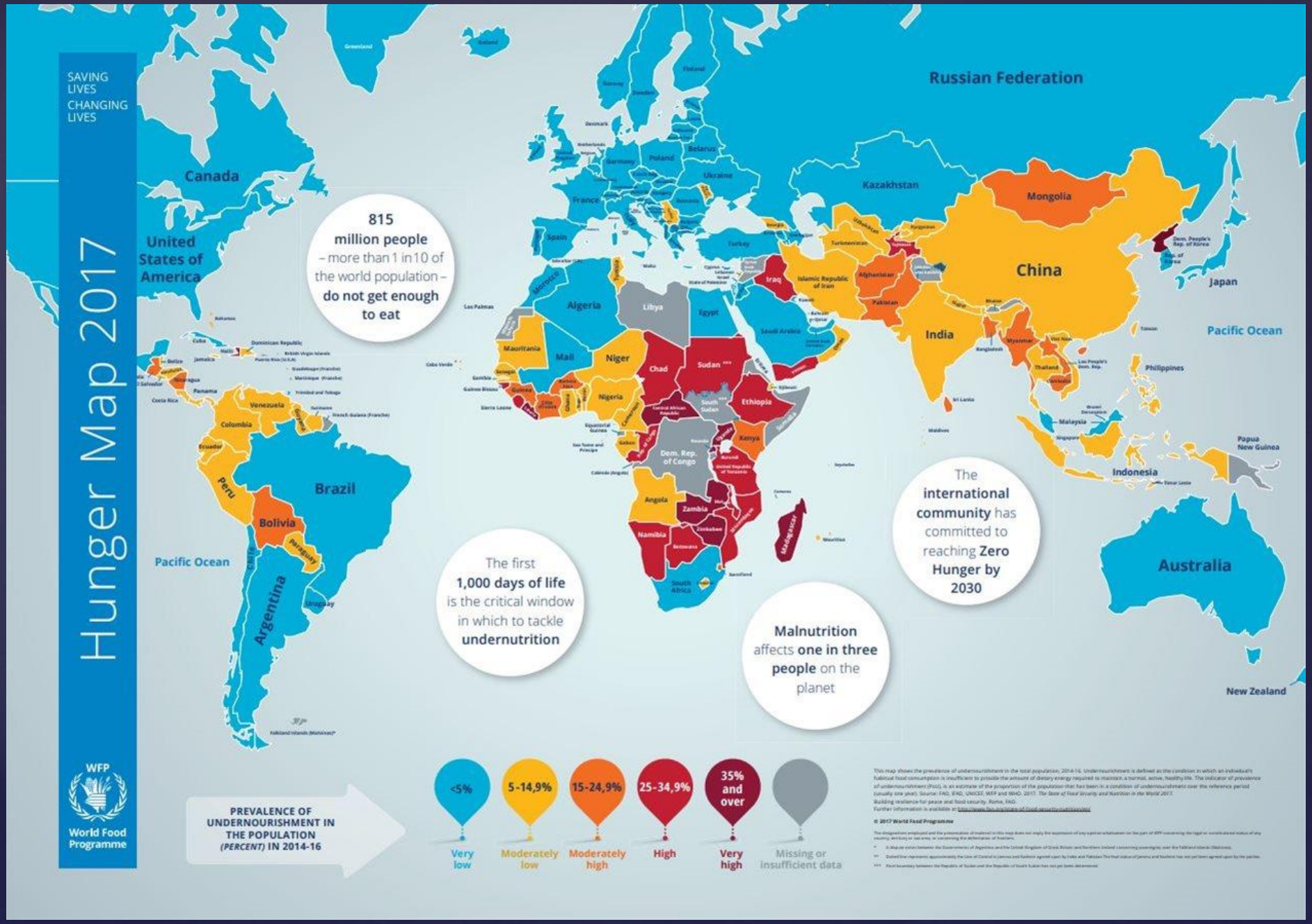
CLIMATE CHANGE, induced
by the addition of GREENHOUSE gases to the atmosphere,
is one of the greatest threats to sustainability.

Actions to reduce Greenhouse gas emissions:

- ✓ Promotion of more efficient energy use in homes, offices, industry, transport, agriculture.
- ✓ Adoption of solar and other low-impact renewable energy systems.
- ✓ Establishment of tree plantations. Maintenance or expansion of forests.
  Both major absorbers of atmospheric Carbon Dioxide and reservoirs of Biological Diversity.
- ✓ Development of ways to reduce Methane Emissions.
- ✓ Reduction of Greenhouse Gas Emissions from Agriculture.

Actions should include:

- Reduction of nitrous oxide emissions by using improved fertilizers, animal manure and compost, and better technologies and practices for fertilizer application.
- Cultivated areas marginally suitable for annual cropping to be converted to perennial cover crops or forests (increasing Carbon Uptake).
- Application of Low Input Farming Systems.


SAVING LIVES
CHANGING LIVES
Hunger Map 2017
815 million people – more than 1 in 10 of the world population – do not get enough to eat
The first 1,000 days of life is the critical window in which to tackle undernutrition
Malnutrition affects one in three people on the planet
The international community has committed to reaching Zero Hunger by 2030
Russian Federation
Canada
United States of America
China
India
Brazil
Australia
Indonesia
Pacific Ocean
Pacific Ocean
Japan
New Zealand
PREVALENCE OF UNDERNOURISHMENT IN THE POPULATION (PERCENT) IN 2014-16
<5%
5-14,9%
15-24,9%
25-34,9%
35% and over
Very low
Moderately low
Moderately high
High
Very high
Missing or insufficient data
WFP
World Food Programme

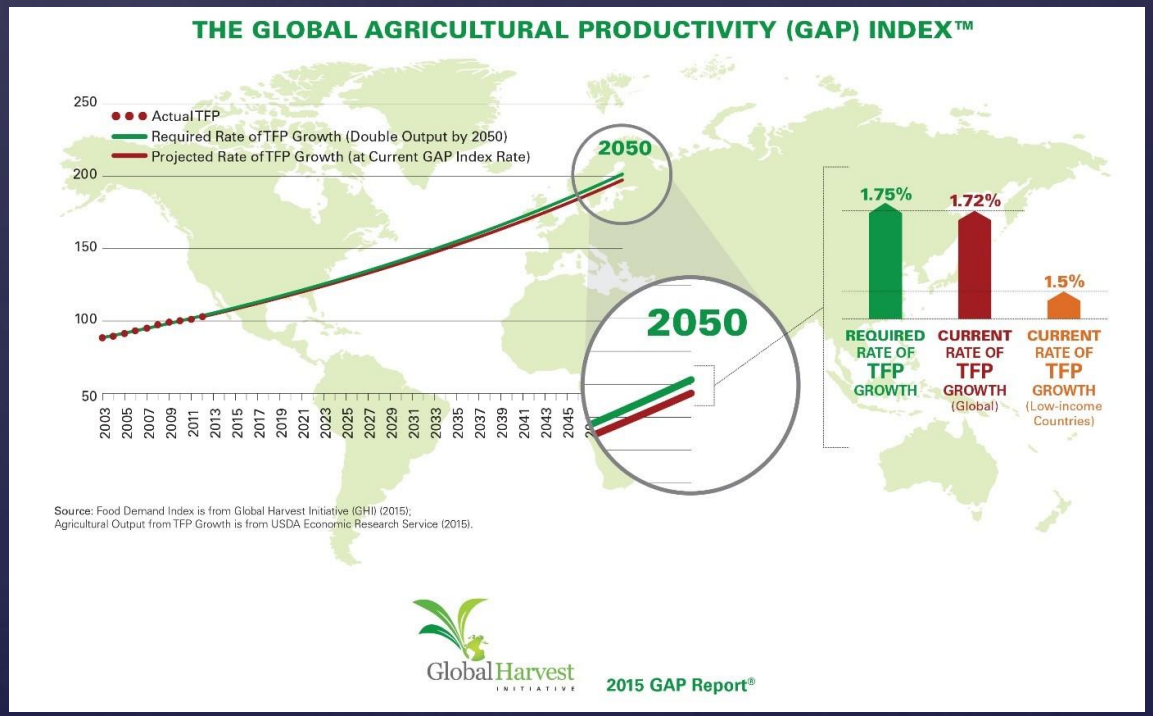
- Sixty two million hectares (20%) of irrigated land, an area equal to the size of France, are affected by salinization.
- Six to seven million hectares of agricultural land become unproductive each year due to erosion.
- Two billion hectares of land are affected by human-induced soil degradation
- Five point five million hectares (70%) of the world's drylands are affected by land degradation leading to an annual loss of production worth US$ 42 billion.

The increased production needed to feed increasing population must come through better use of the land being already farmed.

Most “unused” land has little agricultural potential (poor soil, low rainfall).

Such land can maintain life-support systems and biological diversity and provide timber, nuts and other wild resources.

TFP= Total factor of productivity



The structure of the world agriculture is changing.

In high-income countries, family farms are replaced by corporate holdings.

In low-income countries, programs to increase agricultural production target to large farms with fertile soil located in well watered areas.

In both cases, the small farms have no future unless steps are taken to provide them viable alternatives.

Actions to promote sustainable agriculture in both high-income and low-income countries:

1. Prepare and implement strategies and plans to use agricultural land optimally
2. Provide appropriate economic incentives and support
3. Conserve genetic resources
4. Control the use of pesticides and fertilizers
5. Minimize energy use/inputs

1.Prepare and implement strategies and plans to use agricultural land optimally

- UNDERTAKE A NATIONAL STRATEGY FOR SUSTAINABILITY
- PROTECT THE BEST FARMLAND FOR AGRICULTURE

- **PROMOTE EFFECTIVE SOIL AND WATER CONSERVATION THROUGH PROPER LAND HUSBANDRY**

PRINCIPLES OF GOOD HUSBANDRY

- Promote cooperation between local communities and technical staff
- Respect land capability
- Manage rainwater
- Reduce runoff before attempting to control its flow
- Conserve soil
- Maintain plant cover
- Adopt practices that will both increase yields and conserve soil and water

➢ REDUCE THE IMPACT OF AGRICULTURE ON MARGINAL LANDS IN PRODUCTION

In both high- and low-income countries, there are areas of cultivated land not best suited to this use.

In high-income countries such areas should be restored to natural ecosystems.

In low-income countries this is not practicable, as many people who lack other opportunities for employment live in these areas.

The solution for the latter case is to adopt low-impact production systems such as agroforestry.

AGROFORESTRY

Agroforestry systems include trees as a main component in a multi-crop production process.

The other components could be :

- Annual crops
- Permanent crops
- Pasture land grazed by livestock
- Animals

- **ADOPT INTEGRATED FARMING SYSTEMS AND RAISE THE FERTILIZER EFFICIENCY**

- **INCREASE THE PRODUCTIVITY AND SUSTAINABILITY OF RAINFED FARMING**

2. Provide appropriate economic incentives and support

- ATTEMPTING TO INCREASE NON-FARM EMPLOYMENT FOR SMALL FARMERS AND LANDLESS
- SWITCHING FROM PRICE SUPPORTS TO CONSERVATION SUPPORTS
- PROMOTE PRIMARY ENVIRONMENTAL CARE BY FARMERS

3. Conserve genetic resources

- **PROMOTE INTERNATIONAL ACTION TO CONSERVE GENETIC RESOURCES**
- **EXPAND *EX SITU* EFFORTS TO CONSERVE GENETIC RESOURCES**
- **PROMOTE *IN SITU* CONSERVATION OF WILD GENETIC RESOURCES**

4. Control the use of pesticides and fertilizers

- PROMOTE INTEGRATED PEST MANAGEMENT
- CONTROL OF USE OF FERTLIZERS, PESTICIDES AND HERBICIDES THROUGH REGULATIONS AND INCENTIVES.

5. Minimize energy use/inputs

- DEVELOP EXPLICIT ENERGY STRATEGIES
- REDUCE THE USE OF FOSSIL FUELS
- DEVELOP RENEWABLE ENERGY RESOURCES
- USE ENERGY EFFICIENTLY