



SIDE-EVENT (COP 22)

**PRESENTATION OF THE FINDINGS OF IRES' 2017
STRATEGIC REPORT**

GLOBAL CHALLENGES FOR THE BIOSPHERE

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SUMMARY

FOREWORD

- ❖ INCREASING IMPACTS OF CLIMATE CHANGE
- ❖ CLIMATE CHALLENGES COUPLED TO A STRONG ALTERATION OF THE BIOCAPACITY OF THE PLANET
- ❖ IMPACTS OF CLIMATE CHANGE AND ECOLOGICAL FOOTPRINT: ZOOM ON AFRICA
- ❖ THE NEED FOR ACTIVE ADAPTATION AND ANTICIPATION STRATEGIES

CONCLUSION

The strategic report 2017 of the Royal Institute for Strategic Studies (IRES) is the third edition of a series of reference reports entitled Panorama of Morocco in the World. The aim of these annual reports is to present a situation as a whole (Big picture) in order to better understand the implied systemic issues.

As a reminder:

- The strategic report 2015 was devoted to examining major transitions at the global level and their impact on Morocco in terms of risks to be avoided, opportunities to be seized and breaks to be anticipated.
- The strategic report 2016 was dedicated to the study of Morocco's international relations.

This third Panorama (2017) is centered on the crucial issues of climate change and the ecological footprint. Elaborated on the occasion of the World Climate Conference in Morocco (COP22), this report is a contribution of IRES to the international reflections on climate change, by offering a systemic and forward-looking point of view on this great challenge: the transformation of the natural conditions of human beings' living environment.

The purpose of this report is :

- to focus on the factors that are most often overlooked such as methane for the climate change and the ocean system in the case of the ecological footprint,
- to show that an integrated approach to climate change and the ecological footprint is the sole available option to face the scale of the transformations under way,
- to sensitize the imperative to rethink the whole relationship of Man to nature.

Several terms can be used to indicate this challenge: ecosystem, biota, ecosphere, biosphere... The concept of “bioshpere” was selected for its holistic and interdisciplinary nature and, more importantly, for its scientific rather than political reference.

The **biosphere** refers to all living organisms on planet Earth, from the single cell to multiple biomes (ecoregions).

STRUCTURE OF THE REPORT :

Climate change and the ecological footprint both constitute a part of this *Panorama* issue and are addressed in the same manner, according to the following approach:

- ❖ Causes and evolution of the phenomenon.
- ❖ Situations in 2015 and prospects in 2050.
- ❖ Current and expected impacts of the phenomenon
- ❖ Decisive factors
- ❖ Implemented or contemplated strategies

Three geographical standpoints are put forward:

- ❖ The global scale, which provides an accurate picture of the situation in its systemic magnitude.
- ❖ A focus on key regions for Morocco: the Mediterranean eco-region and the African continent.
- ❖ A national approach focused on Morocco.

The third part of the *Panorama* explains the different visions of the world that rely on concepts such as sustainable development or the blue economy. It tackles the complex problem: How to feed the planet?

The strategic report for 2017 was based on data published by international organizations and on an extensive bibliography, including more than 130 references, in addition to the work carried out by IRES since 2009 within the framework of its study program on climate change.

INCREASING IMPACTS OF CLIMATE CHANGE

ANTHROPOGENIC CLIMATE CHANGE

7

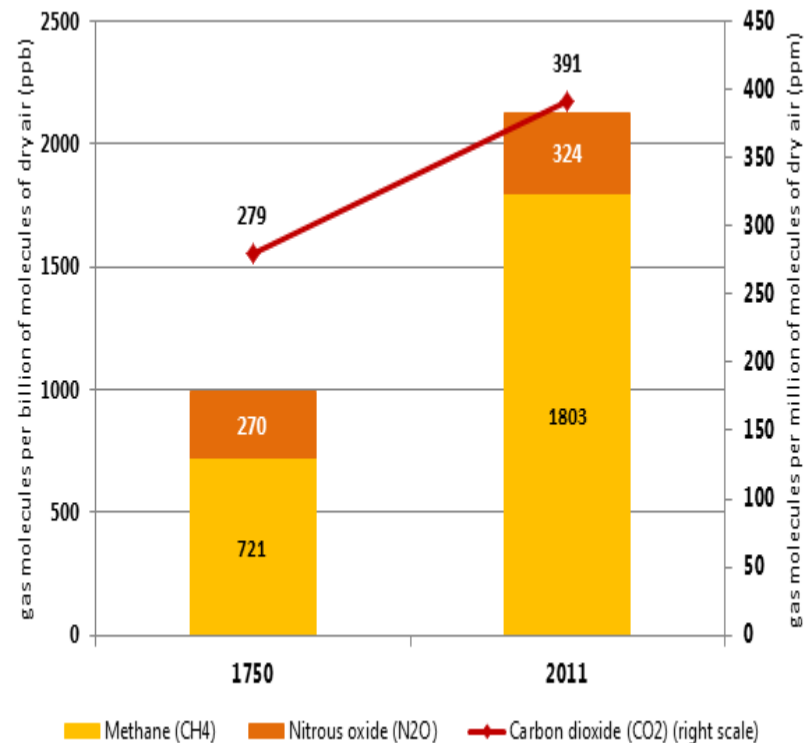
The effects of climate change can already be felt in 2015, as indicated by the following:

- Record temperatures: the warming threshold of $+1^{\circ}\text{C}$ in 2011-2015 was reached, as compared to the preindustrial period.
- Altered precipitation regimes: increase of heavy rainfall in the North and minimized wet seasons in the South.
- Extreme weather events occurring with increasing frequency
- Retreating glaciers in both hemispheres, a serious threat to drinking water reservoirs

The global climate situation is expected to worsen in the future. According to the IPCC (5th report, 2013, hence before the Paris agreement) :

- **A temperature rise:** Between 2046 and 2065, given current mitigation, average temperature on the Earth's surface would probably increase by 1.4°C , compared to 1986-2005, based on the intermediate scenario (RCP 4.5).
- **A significant sea level rise:** Faster than that observed between 1971 and 2010, the rise would be 26 cm on average (RCP 4.5) by 2046-2065, knowing that 60% of the world population in 2015 lives within 150 km of a coast.

Atmospheric concentration of greenhouse gases between 1750 and 2011



Source : Data from the Fifth Assessment Report of the IPCC _ IRES processing

MULTIDIMENSIONAL IMPACTS OF CLIMATE CHANGE

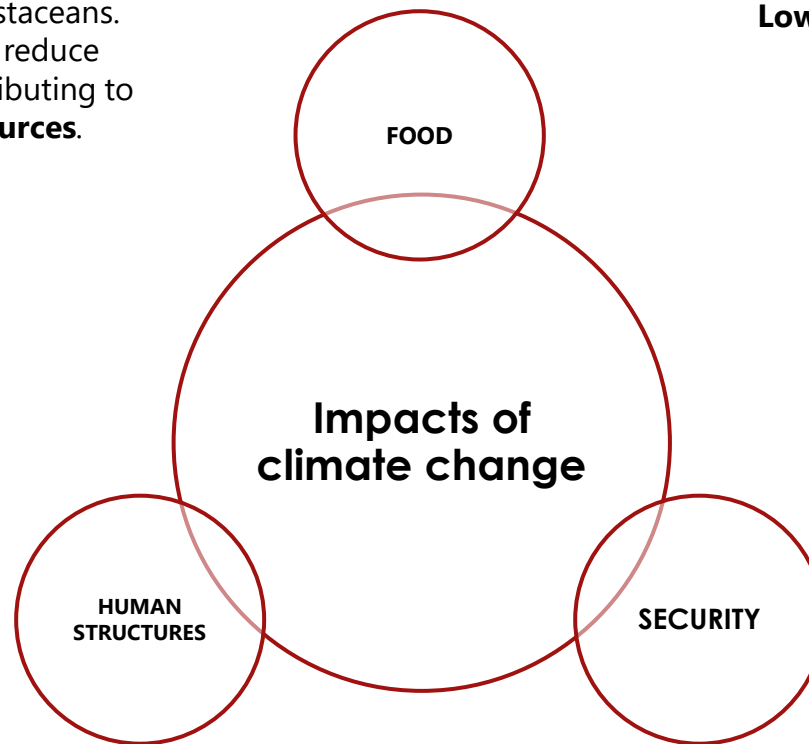
8

Reduced availability of water resources, both in terms of quantity and quality, especially in dry or subtropical regions

Higher ocean acidity, negatively impacting coral reefs and crustaceans.
Freshwater runoff could also reduce seawater salinity, thereby contributing to the **decline in fishery resources**.

- **Heightened vulnerability** of populations concentrated in urban coastal areas

- **Climate migration**: about **200 million** people could migrate by 2050 according to the International Organization for Migration.



Lower crop yields, due to floods as well as droughts

- **Food security** : **400 million people would be undernourished by 2050** (FAO), due to climate change and alteration of resources.

- **Health security**: Despite continued economic growth and progress in the field of health, **between 2030 and 2050, about 250 000 additional deaths per year** could be attributed to effects of climate change

- **Civil security**: The increased frequency and scale of climate events has an impact on internal security of the affected territory

TWO DECISIVE FACTORS : THE METHANE AND THE SITUATION OF OCEANS

9

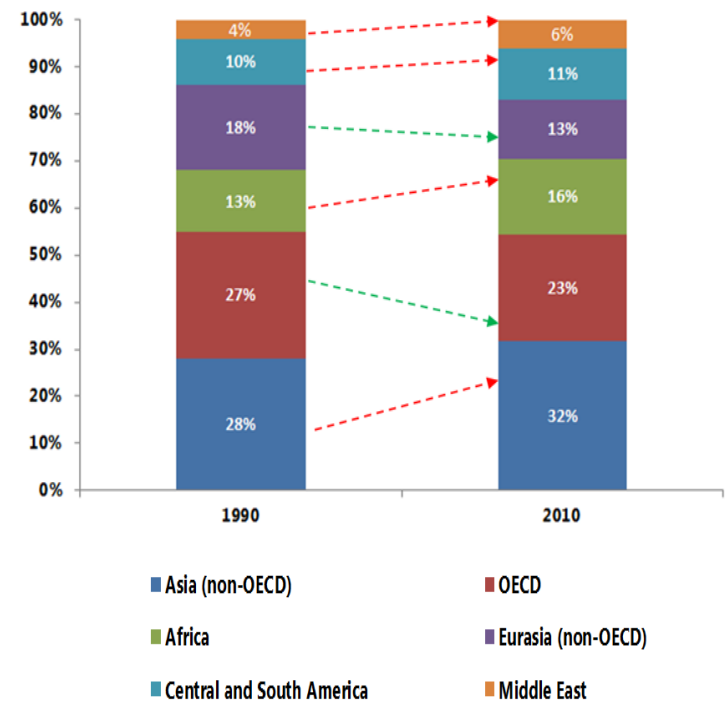
Significant increase of methane emissions: In 2010, methane made up for 16% of total GHG emissions. While its lifetime in the atmosphere is relatively short (12 years), it contributes 25 times more than carbon dioxide to the greenhouse effect (GWP = 25) as its molecules trap about 30 times more heat than carbon dioxide molecules do.

A country's level of development is not correlated to the intensity of its methane emissions

Alarming situation of Oceans : Oceans are the critical place where climate change and the huge ecological footprint meet with full force:

- A 26% increase of ocean acidity in the past two centuries according to the 5th IPCC report, impacting biodiversity (25% of corals are affected),
- Deoxygenation in some areas, owing to the disappearance of plankton that convert CO₂ into oxygen.
- Alongside with sea level rising, warming could also have an impact on ocean currents, which renew water by moving it around, and shape our climate. The Gulf Stream has already started to slow down.

Regional distribution of methane emissions (CH₄) (%)



Source : United States Environmental Protection Agency. Global Anthropogenic Non-CO₂ Greenhouse Gas Emissions: 1990-2030: Data annexes. 2012 _ IRES processing

There are three main types of strategies to face climate change: mitigation, adaptation and anticipation.

In particular, adaptation policies differ according to country's level of development :

- ❖ **Developed countries:** adaptation strategies focus on anticipation and management of climate risks, and are closely linked to mitigation strategies. These strategies revolve around the notions of climate security and green growth, and rely on technological and industrial innovation to reconcile environmentalism and development.
- ❖ **Developing countries:** strategies are very local, and aim to build the population's capacity and the resilience of vital sectors (agriculture, fisheries, water, energy, forests). They are part of sector- and territory-based projects (rural areas, protected areas...),

Two obstructing factors undermine the effectiveness of climate change strategies :

The issue of costs. To break the deadlock, climate change must absolutely be made a driver of growth, by showing that its related changes are opportunities waiting to be seized to create added value and jobs.

The second obstructing factor today is **that medium and long-term effects fail to be taken into consideration**, whether it possible drivers of change (development strategies) or the impacts of mitigation and adaptation measures

CLIMATE CHALLENGES COUPLED TO A
STRONG ALTERATION OF THE
BIOCAPACITY OF THE PLANET

THE ECOLOGICAL FOOTPRINT CONCEPT

12

"The ecological footprint is a concept that calculates the area of land and water needed to sustain a defined human population, based on the population's use of energy, food, water, building material and other consumables (...) it is a useful accounting tool whose purpose is to demonstrate the effect of human consumption on the productive capacity of the Earth" (Source : www.greenfacts.org)

The ecological footprint is spread across six land use categories: forests to absorb human emissions of CO₂, forests for wood production, cropland, grazing land, productive marine and lake areas and built-up areas.

"Overshoot" of the regenerative capacity of the planet has been made possible by the consumption of the resources available: trees cut at a rate higher than the one needed for their growth, more animals taken from the wild than those born and more emissions - including carbon - in the atmosphere than the biomass can absorb and degrade.

The global pressure on land and marine ecosystems increases as the world population grows since there has yet been no disconnect between economic growth and environmental impact.

The human ecological footprint has exceeded the planet's biocapacity since the 1970s. The ecological deficit has been growing year after year, like a debt. According to the Global Footprint Network - August 13, 2015 - in less than eight months, humanity has used up all of the resources produced by nature in one year.

In 2015, it took nearly 1.5 Earths to provide the biocapacity needed to support humanity's footprint. Although the structure of humanity's ecological footprint is carbon-dominated today due to the consumption of fossil fuels (59% of the total footprint), we must not be distracted from the bigger picture : land degradation, drinking water supplies and the destruction of biodiversity are just as serious for the future of humanity.

AN ECOLOGICAL FOOTPRINT EXCEEDING THE BIOCAPACITY OF THE PLANET

13

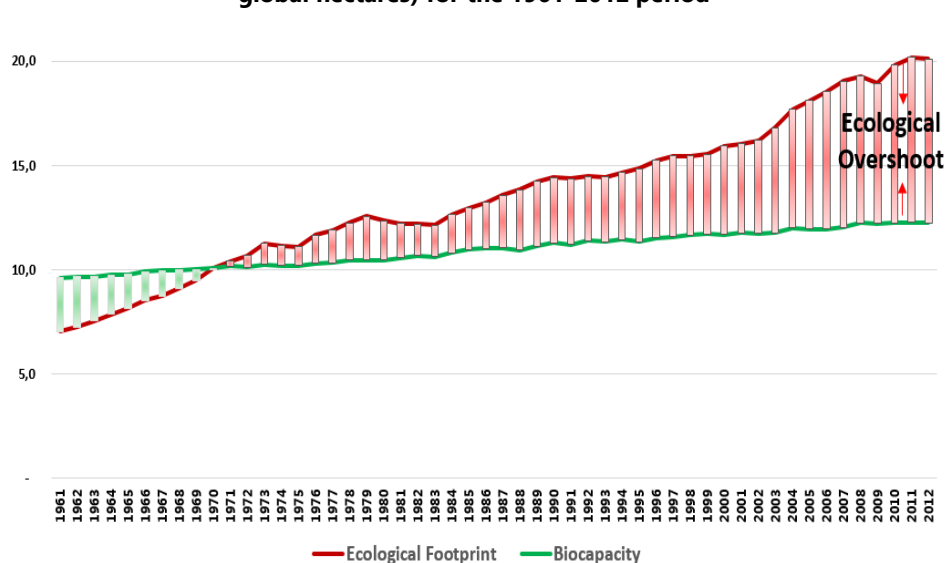
In 2012, the ecological footprint for the world was 20.1 billion global hectares, or the equivalent of 2.84 global hectares per capita whereas the planet's biocapacity is 12.25 billion global hectares, or 1.73 global hectares per capita.

This overshoot of the average global per capita biocapacity now concerns 128 out of 187 countries studied by the Global Footprint Network.

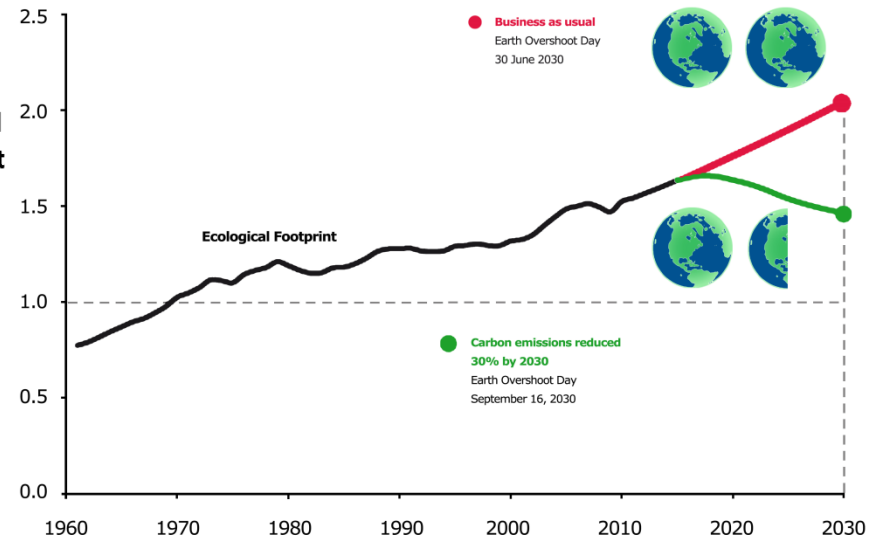
In 2012, 5 countries accounted for approximately half the global ecological footprint: China, the United States of America, India, Russia and Japan.

The largest component of the ecological footprint is carbon, in the form of CO₂ emissions, the main emitters being China, with 27%, and the US, with 16%.

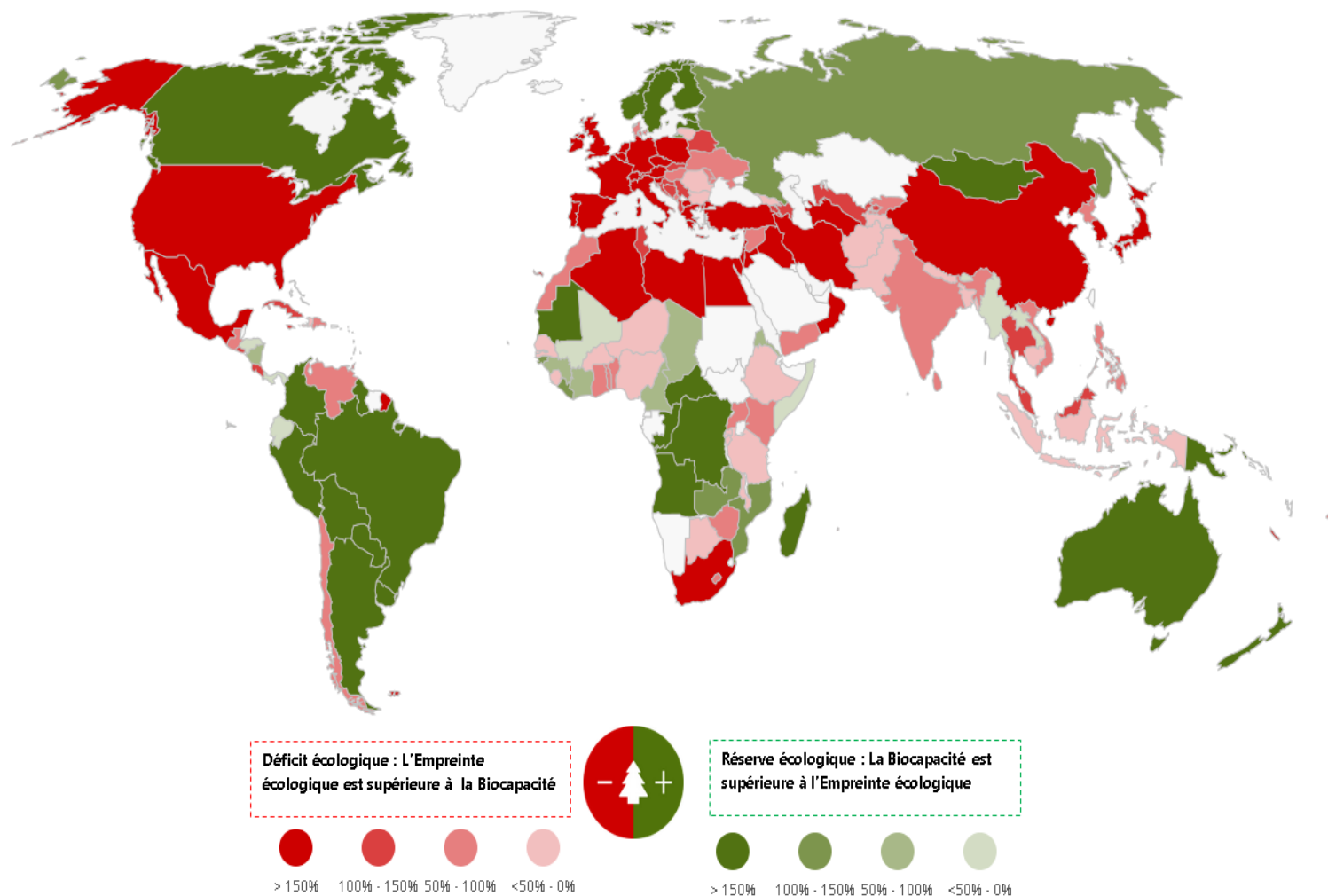
Evolution of the global ecological footprint and biocapacity (in billions of global hectares) for the 1961-2012 period



Number of Earths it takes to support humanity by 2030



Ecological Deficit / Reserve (2012)



Source : Global Footprint Network _ National Footprint Accounts, 2016 edition _ IRES processing

FACTORS LEADING TO THE GROWING ECOLOGICAL FOOTPRINT

15

Several concurrent factors contribute to the growing ecological footprint, including the following :

- **strong increase of the world population** which led to significant socio-economic needs to be met. The world population stands at 7.3 billion people today and could exceed 9 billion by 2050, according to UN projections,
- **a larger global middle class**, with daily per capita consumption between 10 and 100 dollars. In 2009, the total number of people falling under this social category stood at approximately 1.8 billion; that figure could jump to 5 billion people by 2030 according to the OECD,
- **unsustainable development patterns** that prevailed in developed countries and that were, until recently, presented as the exclusive model for growth,
- **accelerated catching-up by emerging countries** whose demand for natural resources has increased significantly to support the development of their productive systems. According to the IMF, the share of large emerging countries in the global GDP rose from 12% in the early 1990s to 32% in 2015 and is expected to stand at 45% in 2030,
- the effects of **climate change**, including alteration of the agricultural production base and threats to biodiversity. According to the Global Environment Fund, the total agricultural area worldwide will increase by 20% by the year 2020, compared to 2000.
- the **strong growth of international trade** makes it possible for ecological deficit countries to import natural resources from abroad in order to meet their needs.

GROWING AWARENESS

Biodiversity

Deep concern about fast, irreversible loss of biodiversity and the growing awareness of the importance of its role for humanity led to the adoption, in 1992, of the **Convention on Biological Diversity**.

This legally binding global treaty has three main objectives: the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilization of genetic resources. (source: www.greenfacts.org)

Near-universal participation has been achieved through this agreement, to which 195 countries are currently signatories.

The tenth **Conference of the Parties in Nagoya**, held in 2010, decided the following:

- combat biopiracy : better access to genetic resources, more equitable sharing of benefits arising from their use ...
- adopt a 2011-2020 strategic plan, comprising 20 quantified sub-goals advocating the elimination, by 2020, of subsidies that are harmful to biodiversity
- set up a scientific and political intergovernmental platform on biodiversity and ecosystem services, the equivalent of the IPCC for biodiversity; its first report was published in February 2016.

Waste

To tackle the waste problem, several conventions were concluded under the aegis of the United Nations, including the following:

- the **Basel Convention**, which was adopted in 1989 and which entered into force in 1992, deals mostly with the regulation of cross-border trade of hazardous waste. This agreement also insists on the full implementation of treaty commitments.
- the **Rotterdam Convention**, which was adopted in 1998 and which entered into force in 2004, regulates the information and communication system on the management of hazardous waste.
- the **Stockholm Convention**, which was adopted in 2001 and which entered into force in 2004, aims to limit the production of chemicals and reduce the release of persistent organic pollutants, including pesticides and dioxins.

- ❖ **Decreasing water resources** which has a triple impact on **ecosystems and species balance, economic development capabilities and the survival of human**
 - How can we, from now until 2050, continue to ensure water security and food production at a time when drinking water supplies are rapidly shrinking and there will be more than a 25% increase in world population?
- ❖ **Deforestation and the reduction of the plant cover**, which could lead to a reduced production of oxygen and carbon dioxide storage, a loss of biodiversity and soil degradation.
 - How to combat climate change without causing a deterioration of the conditions for the survival of local populations today, and without affecting the survival prospects of future generations?
- ❖ **Proliferation of pollution and the overall toxicity generated** by humanity today is greater than the planet's absorption / degradation capacity.
 - How can we reinforce developing countries capacities in the area of waste treatment that could have a significant impact on their biocapacity and how to upgrade their regulatory framework to better regulate the trade in hazardous waste?

TWO DECISIVE FACTORS : ALIEN GENERATION AND OCEAN DEGRADATION

18

- ❖ **Alien Generation** will be, from 2030, the majority of the working population in the world. First to share common values around the world, it will have a significant influence on the behavior and lifestyles. This generation's appetite for new technology could foster and accelerate the development of autonomous management systems, controlled by artificial intelligence systems, including in agriculture.
- ❖ **Ocean degradation** : oceans are a major disruption factor for the terrestrial ecosystem; however, the main reason for this is not climate change, but human activity, through the discharge of industrial effluents, the emptying of tanks out at sea, the discharge of untreated wastewater (80% of wastewater discharged into the Mediterranean is not treated)

IMPACTS OF CLIMATE CHANGE AND ECOLOGICAL FOOTPRINT: ZOOM ON AFRICA

AFRICA : AN INCREASING VULNERABILITY TO CLIMATE CHANGE....

20

Africa's great challenge lies in the fact that this continent must continue its development in a context of climate change and at a time when the ecological footprint has already exceeded the biocapacity of several African countries.

Situation/Impacts

Africa vulnerability to climate risks would worsen at 2050 :

- By 2050, 350 to 600 million Africans would be exposed to **water stress**
- Increasing numbers of people would be **displaced by climate**. According to the Global Environment Facility, by 2020, nearly 60 million Sub-Saharan Africans will leave their region of origin to reach northern Africa and Europe.
- **Changes in precipitation patterns** would hurt crops. Approximately a 2°C temperature rise would induce a 10% decline of total crop yield in Sub-Saharan Africa by 2050.
- **Extreme weather events** (storms, heavy rain, heat waves and droughts) would be substantially more intense.
- **Water-borne and vector-borne diseases** could spread significantly
- **Sea levels** in Africa would exceed world average. Deltas and low-lying coastal areas would face flood and salinization risks.

Adaptation strategies

- **The African Development Bank** incorporated climate change adaptation to its action plan. Designed in partnership with the GCA, it includes, among others, Project financing facilities, particularly in sectors vulnerable to climate change.
- **The Intra-ACP programme of the Global Climate Change Alliance+ (GCCA+)** focuses on the COMESA-EAC-SADC area where climate change translates to higher frequency of extreme weather events (floods, tropical cyclones, severe droughts), threatening food security and civil safety. The programme thereby contributes to building the resilience of the agriculture sector to the impacts of climate change.
- **Adaptation Learning Programme for Africa (ALP)** seeks to help vulnerable Sub-Saharan households to adapt to climate variability by pursuing specific strategies. It relies on community-based adaptation (CBA)

.... COUPLED WITH AN UNSTAINABLE GROWTH OF ITS ECOLOGICAL FOOTPRINT

21

Situation/Impacts

- By and large, Africa's ecological footprint per capita is below the global average. However, African countries' convergence process is straining ecological balances that are already precarious in several African countries. Of particular concern is the situation in North Africa and in some countries in Southern and Eastern Africa.
- In 2012, Africa's ecological footprint per capita was 1.4 GHA, which is almost equivalent to the continent's biocapacity.

The problems of water resource availability, loss of biodiversity and waste absorption will affect the future of the African continent.

- **Water availability** : The percentage of African countries suffering a shortage of water, which in 2014 was 37%, could reach 65% in 2025, according to the United Nations Environment Programme. Moreover, by 2050.
- **Loss of biodiversity** : The Living Planet Index for animal populations in Africa fell 39% between 1970 and 2008. Today, about 1,780 African vertebrate species are considered in critical danger of extinction, endangered or vulnerable, according to the Red List of the International Union for the Conservation of Nature.
- **Waste absorption** : Waste absorption is a major concern for Africa even though the continent accounts for only 5% of the total waste generated in the world. The management of this waste is a challenge to which African cities would have to rise.

Adaptation strategies

• **Wildlife strategy**

In June 2015, Africa adopted a wildlife strategy. It aims to encourage African countries to react in a concerted manner to combat illicit trade in flora and fauna.

• **Project of the Central Africa Forests Commission**

This project, which concerns Cameroon, the Congo, Gabon, the Central African Republic and the Democratic Republic of Congo, has three general objectives:

- **Improve decision-making support tools in forest management**
- **Promote scientific and technological knowledge on forest dynamics.**
- **Engage stakeholders to improve management practices and set up a network of actors involved.**

THE NEED FOR ACTIVE ADAPTATION AND ANTICIPATION STRATEGIES

KEY CONCEPTS STRUCTURING THE NEW VISION OF THE WORLD

23

For half a century, a new vision has been taking shape, through different currents of thought and basic references.

After having been first general and sector-specific, the latter have become increasingly inclusive, comprehensive and systemic. Action has become the main concern. "How" has replaced "Why?".

This vision heralds the end of a crude form of capitalism, centered on money as a commodity (speculation) and ever yawning gaps.

It reflects an enduring desire for a world where there is more equality and empathy – a world in which life means more than just unbridled consumerism. Beyond keen awareness of the environmental situation, it involves an acute sense of urgency in the face of sluggishness by many governments: citizens, businesses and various social groups are taking their destiny into their own hands and want to influence the future of the planet.

Based on this vision, a final, decisive approach needs to be developed that takes into account all of the above concepts: the sustainability of development, waste management and pollution control, smart monitoring of activities that are harmful to the biosphere, implementing recyclability, drawing inspiration from nature to promote smarter processes, encouraging local approaches, proximity and low-tech solutions, frugal innovation, mutualization, sharing ...

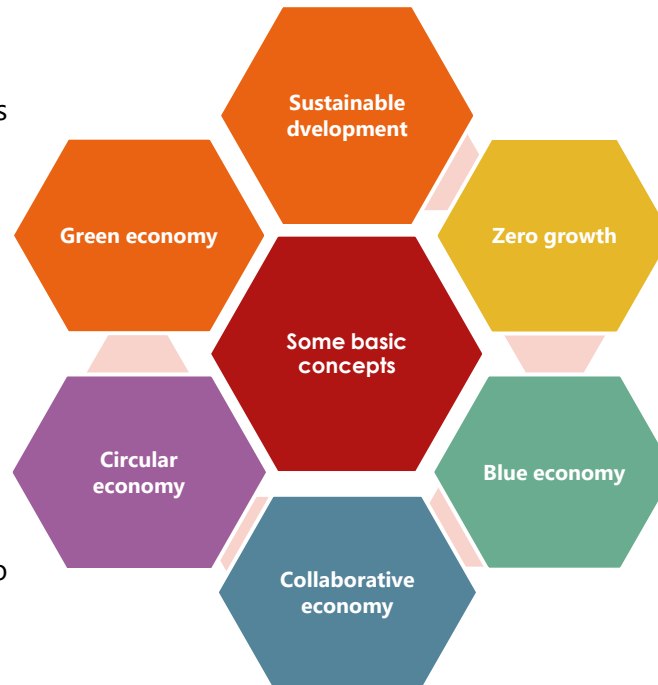
SOME KEY CONCEPTS

24

This concept has the advantage of showing the interdependence that exists between the economy, society and the environment (the three "pillars") and of demonstrating the unsustainability of the current development model, given the planet's biocapacity.

Considered as the actual implementation of sustainable development; in fact, it mainly concerns promotion of waste treatment and pollution control.

This approach has the advantage of clearly reorganizing activities and of promoting recovery; it can be immediately applied, which is already the case in some countries. Since it does not question industrial growth, it may not be radical enough to initiate an overhaul of the economic system.



Based on a systems approach that highlighting the close interdependence between the components of the world system, this concept advocates strong regulations as the only means to sustain economic progress while preserving natural resources:

Inspired by nature (biomimetics), its aim is to forge a new business model, using a minimum of natural resources and a maximum of the local resources available

Under this economic model, human activity revolves around the collective production of value and is based on new forms of organization: horizontal, mutual (sharing), community (networks) that are often backed by internet platforms.

Four highly interdependent principles should structure the entire biosphere preservation strategy:

- **Working together:** across-the-board stakeholder awareness is necessary because combating climate change and halting the degradation of the biosphere do not concern public authorities alone.
- **Better knowledge:** Both scientific (planetary weather system, oceanic mechanisms) and statistical (biodiversity, at-risk populations); knowledge must be quickly and significantly improved to better understand current as well as future changes (anticipation).
- **To adapt:** As we face the degradation of the biosphere as well as climate change, the first thing to do is to adapt, pending possible mitigation or improvement. Above all, this involves a state of mind to be shaped through educational programs for all age brackets, taking into account the cultural background.
- **Anticipate** : "There are no natural disasters: disasters only results from human unpreparedness for natural events". Hence the need for greater awareness of the risks involved through their anticipation, the evaluation of their potential impacts and their systematic management to increase resilience, minimize crises and turn risk management into development opportunities

Feeding the planet: a case highlighting the importance of an integrated and holistic approach

26

To better understand what this new worldview represents and how to implement it, we have decided to address the food issue.

feeding hungry people today and produce food for those who will be born in the coming decades will certainly accelerate the degradation of the biosphere (soil, water, air), ultimately spelling doom for humanity.

There are three problems with current food consumption patterns: the exorbitant volume of waste and food waste, nutritional imbalance for the majority of the population, the unsustainable growth of meat consumption in the world, given the high ecological cost of each kilogram of meat produced.

- develop the **circular economy** to recycle waste while levying charges on their production (packaging for instance) at industrial and individual levels;
- promote **short circuits and local production** to reduce costs and ensure better nutritional quality;
- develop and promote a food mode that fosters **brain development** rather than muscle development;
- develop **urban agriculture**.

The degradation of the Earth's biosphere due to climate change, overexploitation of natural resources and pollution is such today that we must ask the **question regarding conditions for the survival of mankind**.

Two major disruption factors have appeared: the release of methane into the atmosphere and mass extinction risks in the ocean.

International awareness of the **urgency of the climate change situation** is a major step towards adopting a mitigation and adaptation policy commensurate with the stakes involved. But focusing on energy and the climate at the expense of all other factors which contribute to the degradation of the biosphere is a risk we must vigorously seek to eliminate.

Despite growing awareness and the adoption of major global objectives, the implementation of regional and national **measures** is still **too slow** and **ineffective**.

Three reasons best explain this situation:

- the **great complexity of natural systems** which are not yet fully understood;
- the growing gap between humans and nature due to an **increasingly urbanized and technological world**;
- **population growth** and access, by a large segment of the world population, to a lifestyle which is incompatible with the frugality required.

It is therefore time to act and to implement **concerted actions** at the global level (between countries and regions) and at local level (between different levels of governance), laying emphasis on **subsidiarity** to address problems at the most appropriate scale.

Since it is impossible to address all problems at once, **prioritization** is necessary, building on a **systemic vision** of all factors of change (urgent and correlated) and taking into account the **vulnerability** of the populations concerned – be they human, animal or plant. This vision must be clearly and quickly developed.

Restoring the balance of the biosphere will not happen without developing a new mindset, including a radical break with the predatory attitude of humans vis-a-vis the environment.

In fact, the entire **relationship with nature** needs to be revisited.



THANK YOU FOR YOUR KIND ATTENTION

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