

**BIOFUEL AND CLIMATE CHANGE IN WEST  
AFRICA: A PARADOX OF SUSTAINABLE  
DEVELOPMENT?**

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# INTRODUCTION

In the framework of sustainable development strategies, many countries of the global North developed the industry of biofuel, based on the exclusive use of vegetal oil. This was positive in itself, as it made it possible to pursue the development process, preserving in the same time the possible development of next generations (which is the main principle of sustainable development). Nevertheless, the massive use of cereals in some countries in the North caused the destabilisation of cereal prices on the international markets, leading sometimes to cereal shortages and famine among the poorest populations in the South. This study examines the particular situation of Africa in regard to the biofuel industry, in the framework of climate change.

To what extent did the production of biofuel cause famine riots in Dakar? Can the United States continue to produce soja-fuel without jeopardizing the social peace in the more vulnerable societies on the South? How can we conciliate « nutritive cereals » and « power cereals »? To what extent did the climate change make the situation worse? These are some of the questions to which I will try to find answers in the study.

The research is organised into three sections. The first one tries to show how the production of biofuel matches effectively the basic principles of sustainable development. In the second part I will examine to what extent the industry of biofuel in the North has been a major cause of malnutrition and even famine in Africa, the situation being worst with the climate change. The last part of the paper is a prospective one and proposes a series of realistic recommendations in order to pursue the production of biofuel in Africa without disrupting the food equilibrium, and how to adapt the food strategy to the climate change.

# **1 / SUSTAINABLE DEVELOPMENT AND BIOFUEL**

While classical fuels are processed using fossil resources like oil and gas, bio fuels are liquid combustibles obtained through a process using organic mass, whether they are agricultural products or vegetal waste. Bio fuel can be extracted from oleaginous cultures, as colza or sunflower (generally intended to diesel engines), alcohol (ethanol or methanol extracted from sugar beet or sugar cane, very popular in Brazil), or methane, based on the fermentation of alimentary waste (called also second generation bio fuels), wood or straw. Bio fuel knew a huge success in the whole world, for various reasons.

## **A / A SUBSTITUTE TO OIL**

One of the main reasons why bio fuel has been so largely accepted is that it is substitute to oil. In fact, with the rise in the prices of oil, which went over 100\$/barrel in some periods, all nations started thinking seriously about developing a less expensive fuel. Brazil and the United States were the more active in asking for such a replacing product.

In addition, the reducing oil reserves pushed most countries in the world to look for alternative fuels, by fear to lack power sources, one day or another.

## **B / POLLUTION**

The concepts of sustainable development and green revolution that rose in the 1980's promoted clean energies. For example, the replacement of diesel by pure colza or sunflower oil should theoretically reduce by  $\frac{3}{4}$  gas with greenhouse effect issued during the whole cycle of life of the fuel, from production to combustion, for a same energetic effect.

In contrast with the massive rejection of CO<sub>2</sub> from benzine and diesel during both production and combustion, CO<sub>2</sub> gas rejected by bio fuels during the combustion phase are compensated by the carbon absorbed by plants (colza, sunflower,) during the vegetation phase. In addition, during the combustion process, bio fuels do not issue nor particles, nor ozone, nor suffer. Theoretically, the production of bio fuels in 2003 permitted to save the

equivalent of 220 000 tons of oil. Last, during the whole process of harvest, stocking, delivery and consumption, the risks of pollution are very limited<sup>1</sup>.

But we have to keep in mind that bio fuel needs both human and mechanical energy, and that means that the consumption of classical fuel (diesel for tractors and other agricultural engines for example) and other products that may be harmful for the environment (chemical manure, pesticides,...).

## **C / ENERGETIC DEPENDENCE**

Bio fuels contribute to the energetic independence of African countries, as it becomes possible for countries non-oil-producing to reduce their imports of oil and produce their own energy. Ideological fears may push some countries to refuse depending one day from the occident.

## **D / NEW MARKETS**

Bio fuel represents a new market, and this argument is particularly important in periods of economic crisis. The demand of bio fuel emanating from the global North is thus considered as manna of the sky by African farmers.

Despite a diminishing enthusiasm for bio fuels, just after the reducing in oil prices that took place in 1986, and despite the mighty oil lobby, bio fuels have been considered as the main threat to food security equilibrium in Africa. Next chapter will examine this issue.

## **2 / BIOFUEL AND HUNGER IN WEST AFRICA**

In 2008, 100 million Tons of grains were devoted to the production of bio fuel. In the United States, for example, a quarter of the corn crops were devoted to the production of bio fuel, while this proportion was only 6% in 2005.

If grains crops were totally consumed for food purposes, the worldwide balance sheet of grain products would become again exceeding. That would stabilize grain prices and reduce famine. Jean Ziegler, special commissioner to the United Nations for the right to food, reported that the production of bio fuel was a « *crime against humanity* » (26 October 2007).

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<sup>1</sup> Institut Français de l'Environnement

It would be interesting to try to understand why such a polemic rose against the production of bio fuel, particularly in modern Africa.

## **A / PRICES**

African farmers are attracted by the perspective to sell their products to the solvent multinational companies established in the North, and specialized in the production of bio fuel. To satisfy such demand, they choose to increase the production of bio fuel inputs, at the detriment of the production of alimentary products.

The problem here is that the production of bio fuel needs large quantities of grains. For example, one liter of bioethyl alcohol needs 2.9 kg of wheat, 16.7 kg of sorghum, 5.6 kg of manioc, 14.3 kg of sugar cane or 2.5 kg of corn. Reorienting massively food towards industry had a disastrous effect, creating penury of foods and thus pushing up prices. In fact, the consequent inflation caused impoverishment of persons already affected by poverty and malnutrition.

This inflationary spiral reminds the situation that prevailed in many Sub Saharan African countries during the 1980's, when the traditional food-producing sector (corn, rice,...) has been brutally abandoned to the benefit of exporting products like cocoa or coffee, more lucrative, because they were indexed on international, favorable prices.

## **B / SOCIAL PEACE**

As in many other regions of the world, stabilizing prices is a major guarantor of social peace in Africa. Between 2007 and 2014, many turmoil took place in African cities, and famine riots were reported in countries known for political stability (Senegal, Egypt, Ivory Coast, Cameroon, Burkina Faso,...).

Consequently, after this bad experience, African leaders seemed to have paid much more attention to monitor and control the prices of basic products, which represent an important part of the budget of African households.

## **C / SOIL PRESSURE**

Producing bio fuel requests a lot of agricultural resources, because it is an intensive process. A consistent part of agricultural lands is then attributed to the production of bio fuels,

at the detriment of the food-producing activities. At the present time, the situation does not seem to be critical in West Africa, which is a region particularly concerned by the bio fuel industry. In fact West Africa has a large surface of arable lands, and around 2/3 of them are still to be valorized (9 million irrigable hectares, CSAO, OCDE).

Availability of land in West Africa has brought the attention of the big multinational companies acting in the sector. AgroEd operates in Burkina Faso (exploiting 200 000 ha of Jatropha), in Benin, in Togo, in Guinea and in Senegal, XXI<sup>st</sup> Century Energy is present in Ivory Coast (with a project of producing 3.5 billion liters bio ethyl alcohol per year), Constran acts in Ghana, Viscount Energy in Nigeria,.... There is today a real rush of the multinational bio fuel companies towards West Africa, and investment opportunities are considerable in the sector.

The pressure on lands leads to their degradation. In fact, in order to increase their outputs, African farmers use massive doses of manure and pesticides, contributing to the soil erosion.

## **D / CLIMATE CHANGE**

The major changes in the world's climate today are warming of the atmosphere and oceans, acceleration of the sea-level rise, regular occurrence of natural disasters (floods, droughts, tornadoes, ...) as well as the acidification of the oceans.

In West Africa, climate change is characterized more specifically by warming of the atmosphere, droughts combined with increasing flooding, and especially chronic drought cycles, with disastrous effects on the agricultural production, and a pauperization of the countryside.

On the other hand, West African coastal countries are experiencing a slow rise in the sea level, which has already caused salinization and a reduction in the availability of drinking water along the coasts. This will result in losses of the Gross Domestic Product (GDP) estimated at 10%.

More concretely, in many West African countries, there is a dramatic succession of antagonistic climatic episodes: strong sunlight followed by heavy showers, followed by strong sunlight again. The earth, burnt and dried by this strong heat, hardens and becomes impervious to rain and seed.

Agriculture in West Africa has always been problematic, but it has become clear that the phenomenon has recently worsened. The dry seasons are longer, the storms more violent, and the crops are more and more often random. In such conditions, attributing large proportions of agricultural land to biofuel threatens the local economies.

### **3 / PERSPECTIVES AND RECOMMENDATIONS**

Here are some realistic recommendations in order to pursue the production of biofuel in West Africa without disrupting the food equilibrium, and to adapt the food strategy to the climate change.

#### **A / AGRONOMIC RESEARCH**

We know today that a second generation bio fuels could be produced using agricultural waste. Scientific research can lead West African countries to develop simultaneously alimentary and energetics products, without sacrificing portions of precious lands. Promoting agronomic research could then be a realistic solution, and we know that this sector has been too much neglected during the last decades.

#### **B / PARTICIPATION OF FARMERS**

West African farmers are suffering from poverty, and it is important not continuing exploiting them, but trying to integrate them in the bioenergetics circuits. Win-win partnerships between the various actors present both upstream (farmers, wholesalers) downstream (retailers, bio fuel producers) could be a first step towards the reorganization of the bio fuel sector.

Concretely, that means that we must guarantee a satisfying revenue level for the small peasant, and consider them as responsible actors in the bio fuel process, may be through the reorganization of the interprofessionnal associations.

We should also differentiate between the various steps of production and marketing, delegating more production responsibilities to the farmer. A better integration of the African farmer would revalorize the profession, reduce the pressure on urban spaces (through rural exodus), create additional employment, and finally reduce rural poverty.

## **C / ORGANISATION OF THE BIO FUEL SECTOR**

We recommend to supervise the whole activity of bio fuel, and better inform and train farmers. Professional associations could ease the dialogue between the officers in the Ministries of agriculture and peasants.

It is also necessary to approve and certify the products that are produced and exported, putting in place standards adapted to the international ones. That would make it easier to control the quality of the bio fuel products at the various steps of the process. On the other hand, standards of quality would attract buyers, partners and investors.

Quality labels could help developing the bio fuel sector in Africa. *Club du Sahel et de l'Afrique de l'Ouest* (CSAO, OCDE) has initiated a project that should be furthermore developed<sup>2</sup>.

Last, there is a need of creating a mechanism of price regulation, combining taxes system (to avoid over pricings) and subventions (to avoid impoverishment of the small farmers).

## **D / EXPORT STRATEGIES**

Our leaders must understand that, in these periods of crisis, and in particular food crisis, we have to control the export of basic food, giving priority to the feeding of the populations.

Without falling in nationalist discourses like « land to African peoples », African governments should avoid overexploiting the resources. A better negotiation with multinational companies and the participation of the peasant, grouped in cooperatives, would certainly help in such strategy.

## **E / THE CLIMATE CHANGE DIMENSION**

### **Knowledge**

We should first improve our knowledge of the African monsoon. This can only be done through the establishment of partnerships with research centers and universities, whether at national or international level.

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<sup>2</sup> Club du Sahel et de l'Afrique de l'Ouest/OCDE, Carburants verts, carburants du développement ? *Pour une meilleure cohérence des politiques en Afrique de l'Ouest*, in *Note du CSAO*, n°2, Paris, September 2008

### **Exchange of information**

It is essential to set up a network of real-time exchanges of knowledge and best practices between West African countries. These exchanges would thus make it possible to support field actions, and in particular at the level of village communities and local communities. Such networks would make it possible to implement more effective field actions in West Africa.

### **Changes in certain behaviors**

It is important to work together in order to change certain human behaviors that could eventually lead to climate change at the local level. For example, some West African tribes have a tendency to abuse forestry resources, by over-felling trees, for heating or cooking purposes. For example, the acceleration of deforestation results in an estimated local warming between 3°C and 4°C.

## CONCLUSION

Despite the debate raised by bio fuel in Africa, it is possible to consider this sector as an engine of sustainable development for African. Three conditions seem to be necessary for that. First of all, the production of bio fuel must integrate the small farmers in the whole process, from downstream to upstream, and above all avoid impoverishment of the peasant.

The development of bio fuel must also respect the principle of food security, which has been too much neglected until now. Whatever could be the perspectives of economic development in the short term, we have to keep in mind that the top priority must be given to the local populations, and in particular to their feeding in a proper way.

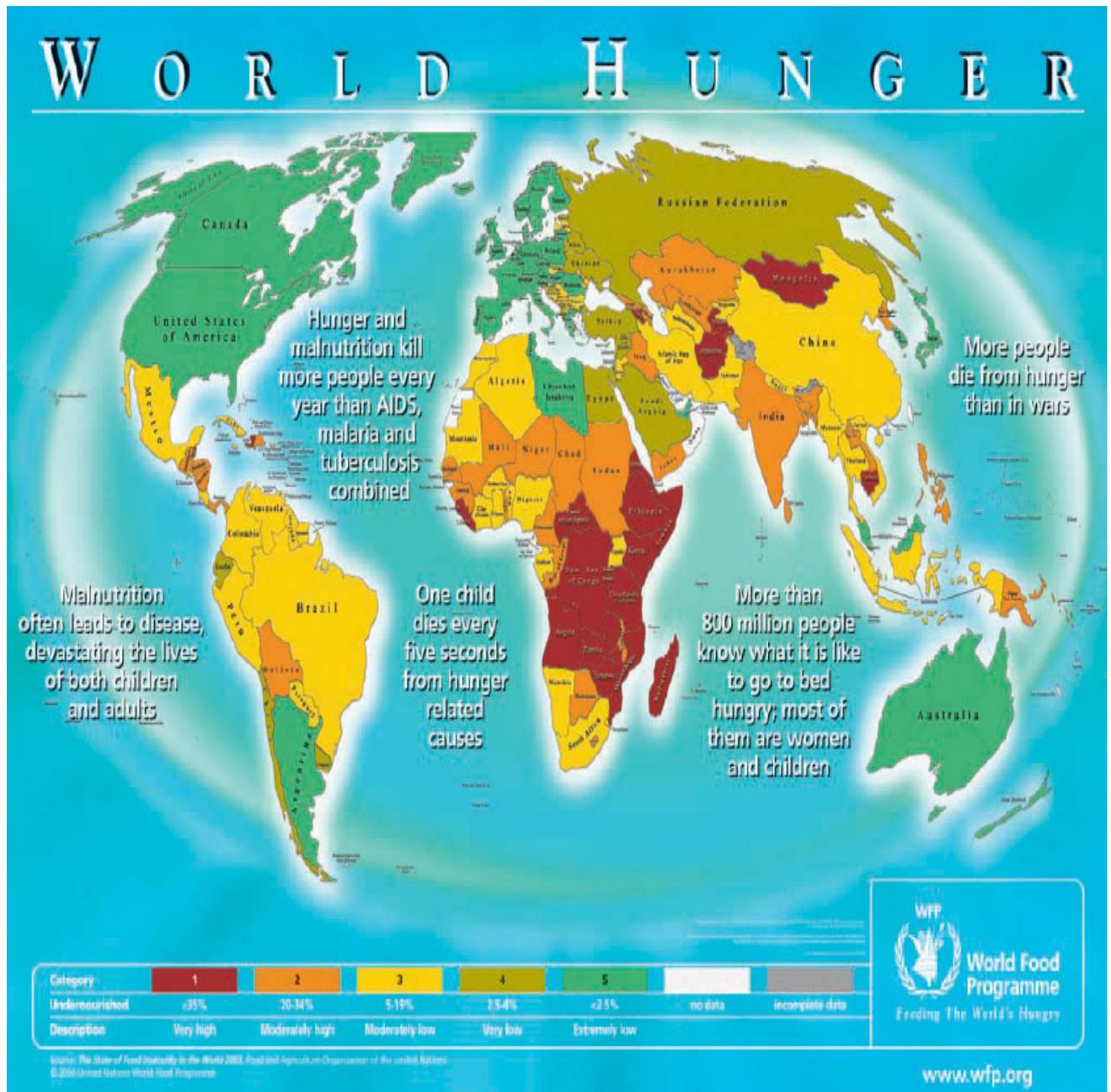
Last, it is necessary to keep a long term vision, and act in order to respect both the environment and the biodiversity, so that Africa could pursuit the development of the bio fuel sector, without threatening the development of the future generations.

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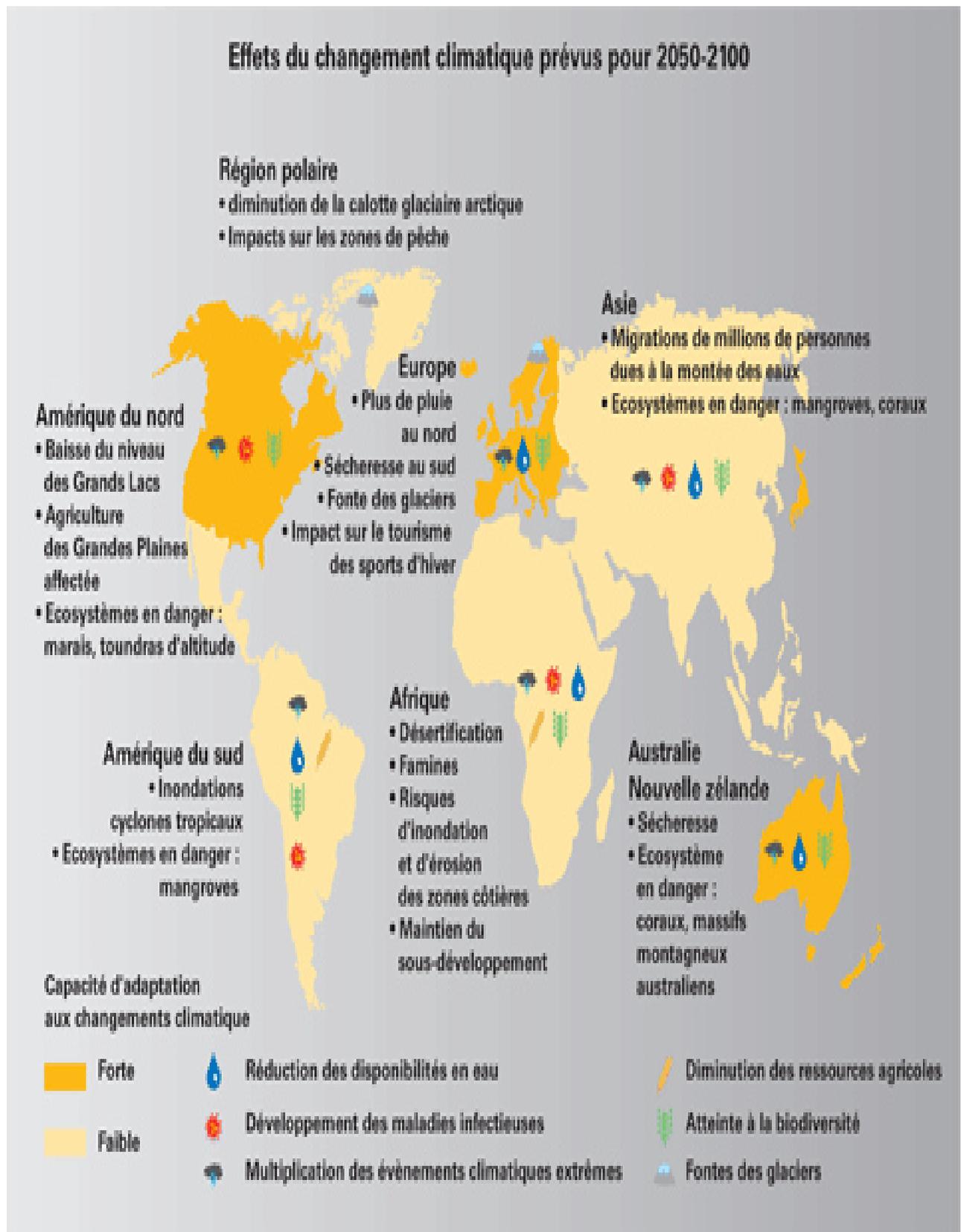
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# **ANNEX**

## Annex 1: Map of hunger in the world



## Annex 2 : Effects of climate change, 2050-2100



### Annex 3: Temperature variation in Africa 2050

