

**Forum :** Health committee

**Topic :** To what extent does irrigation water guarantee food security?

**Presidency:** Léo Tremblay (President); Inès Atif (Facilitator); Charlotte Salmon (Facilitator)

## Introduction

With over 7.5 billion people living on Earth, the question on how to feed them all is getting harder and harder to answer. However nowadays the solution is getting harder and harder to find. Food insecurity is a worldwide issue with many nations not knowing how to feed their entire population, leading to 10.9% of the world population being malnourished. Yet, with new hydraulic technologies emerging in the agricultural field, we might ask ourselves could this be the answer to the food insecurity we see worldwide?

Irrigation is an old mean first used in ancient Mesopotamia, which consists in diverting water from its source into designated areas or canals to hydrate the crop through the soil. It is an essential agricultural technique to be able to maintain crop stability through unexpected dry patches, and help to develop new areas, in which agriculture was not possible before the installation of irrigation. With new irrigational technologies (such as drip irrigation, sprinkler irrigation and center pivot irrigation), many mostly arid nations and regions have been enabled to develop their own agriculture and become more self-reliant on their food production. The question remains, is irrigation sustainable? Will it lead to a long lasting solution to food insecurity, as water resources are getting a lot scarcer. Nonetheless it is a possible way to tackle the issue of food insecurity.

## Key terms

### **Food security**

The final report of the 1996 World Food Summit states that food security "exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life"

### **Food insecurity**

A situation in which a state or community cannot provide food to its population in a sustainable and nutritious way.

### **Physical water scarcity**

A situation where the actual physical supply of drinkable water cannot meet with the demand of a region.

## **Economic water scarcity**

A situation in which, due to a lack of investment in water infrastructure or organization of the community to work together, the demand of drinkable water cannot meet the existing supply.

## **Irrigated water**

Irrigated water is water that is diverted from its source to then be used to hydrate soil that otherwise would be lacking natural water.

## **Different types of irrigation**

There are different types of irrigation systems depending on the uses, the needs and the budget. The most common are ;

- Flood irrigation also known as surface irrigation is the oldest one. Water is delivered into the field by ditch, pipe or other means. It's the most popular method but the most wasteful.



- Drip irrigation also called trickle irrigation consists in distributing water drop by drop onto the soil at very low rates, mostly use for fruits and vegetables. It's the most ecological way of irrigating .



- Centre pivot irrigation is used for large superficies. Water is dispersed through a long arm which rotates around a pivot and covers a circular area. It uses sprinkler irrigation to spread water as if the vegetation was nourished by a rain shower.



## General food insecurity

This ongoing condition has not only been caused by the lack of water but also by a number of factors including distribution difficulties, global climate change, a lack of local agriculture crops, and an inability or disinterest to act by local officials...

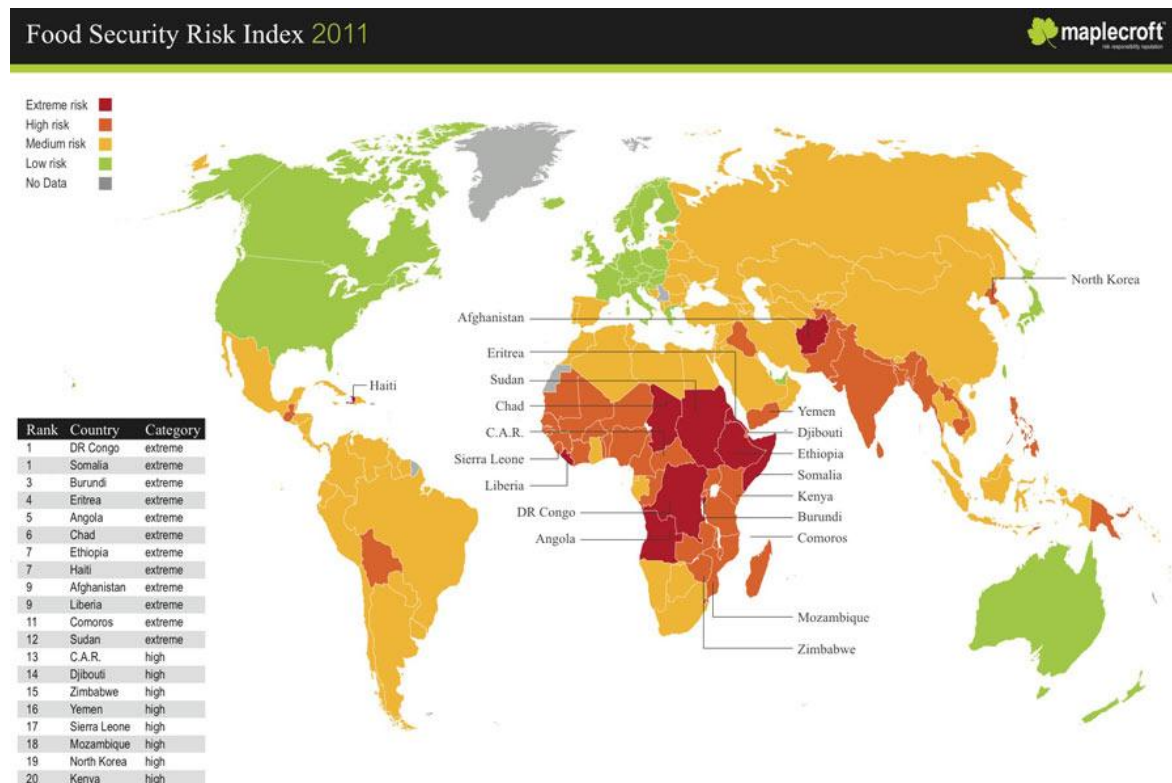
Support for local and regional farming, more climate prediction methods, financial aid for development of irrigated lands' infrastructures, would lead Sub Saharan Africa towards sustainable and reliable food sources and a future food security to improve the global well being of the people.

### FAO Hunger Map 2015:

[http://www.fao.org/fileadmin/templates/hunger-map/images/FAO\\_HUNGER\\_MAP\\_2015\\_sm.jpg](http://www.fao.org/fileadmin/templates/hunger-map/images/FAO_HUNGER_MAP_2015_sm.jpg)

### Food insecurity in developing countries

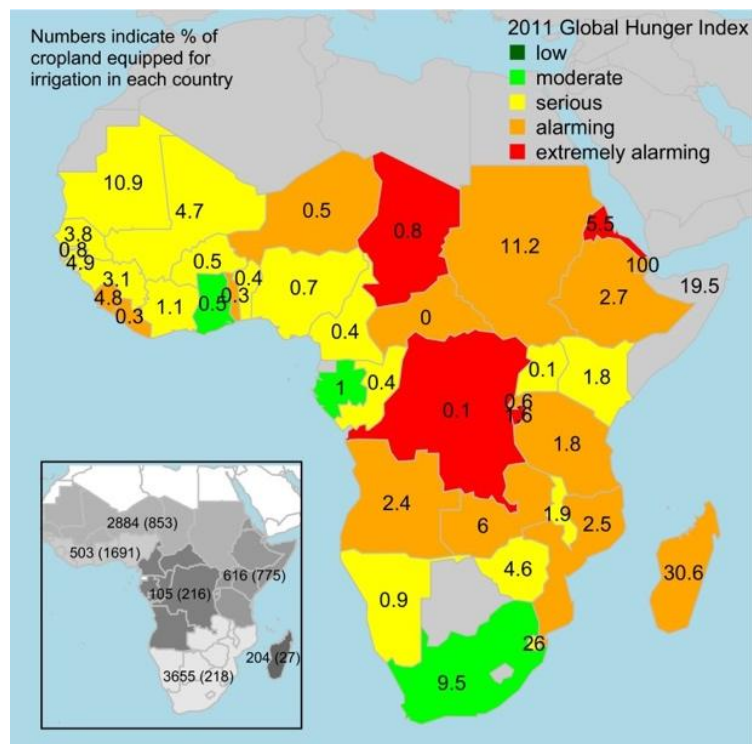
Countries in Africa and South Asia are the ones with the highest rate of food insecurities in the world. It means that 800 millions people are undernourished. In Africa the main issue is water because people there don't have access to drinking water and they can't irrigate their soil or they can't have a good health as the water is often contaminated. If they don't have access to water, they can't irrigate, thus their agriculture isn't really fruitful and people get hungry and sick.



Moreover those countries are not really connected with international trade. That is a major problem because a lot of countries aren't self-sufficient. They need a reliable access to international market so that they can feed all their population and eradicate any sign of malnutrition.

## Irrigation in developing countries

### Sub-Saharan Africa



For almost half a century, Sub-Saharan Africa (SSA) has been struggling, in one form or another, with food insecurity.

25% of the population of sub-Saharan Africa, almost 200 million people, are undernourished. It represents the highest rate of malnutrition, mostly in countries affected by conflicts.

Cereals, roots and tubers play a central role in food supply in sub-Saharan Africa but their production has slowed down as the rate of population growth..

Further, distributed irrigation can provide more than sustainable access to water, irrigation indirectly

brings benefits through agricultural production, such as employment. It also helps in developing activities, for instance means of water transport are improved. Agriculture also generates income for the government. Regularity of available water would increase the income of farmers, making agriculture more stable.

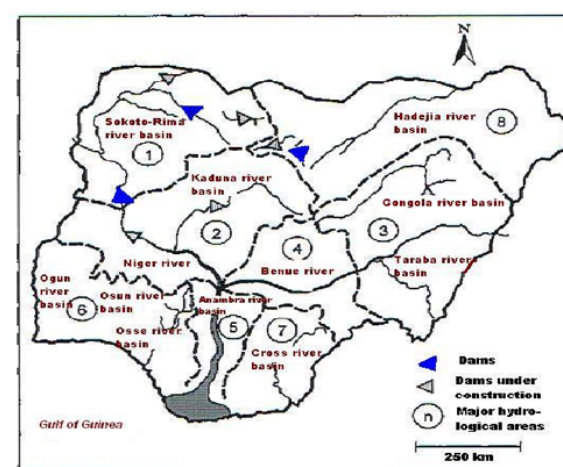
Most of the continent suffers not from physical water scarcity, but from economic water scarcity: in other words, the water is available, but means to put it to use has not been mobilized.

### Example ; Nigeria

The World Bank supported Nigerian National Fadama Development Project (1993–1999). It was aimed to irrigate 50,000 ha with 50,000 tubewells and low-cost motorized pumps. Even if it was an important project, each individual system irrigated only 1 ha. Investment in supporting infrastructure was included as well in the total charge which cost 425.00 million dollars.

In some Nigerian states, farmers experienced an increase in returns per ha of 65 to 500%. Overall, the project increased the income of farmers of 40%, much higher than it was estimated (24%). Rice, tomatoes, cabbages were the most irrigated crops.

The National Fadama Project has been renewed in 2003 and then in 2008.



## Constraints

Irrigation can cause erosion by degrading and dissolving the soil.

Plus we can't avoid the huge quantities of silt stagnating behind dams. Undammed rivers flood and deposit silt along the riverbanks. This provides fertile topsoil to the land. Fertilisers can get into the river and cause eutrophication (lack of oxygen), destroying fishing.

In tropical areas there might be a major issue due to the high evaporation, salts in the soil are evaporating to the surface as irrigation water sits in channels. Which makes the soil too salty to grow plants.

Also as water sits in irrigation channels malarial mosquitoes and bilharzia snails can appear.

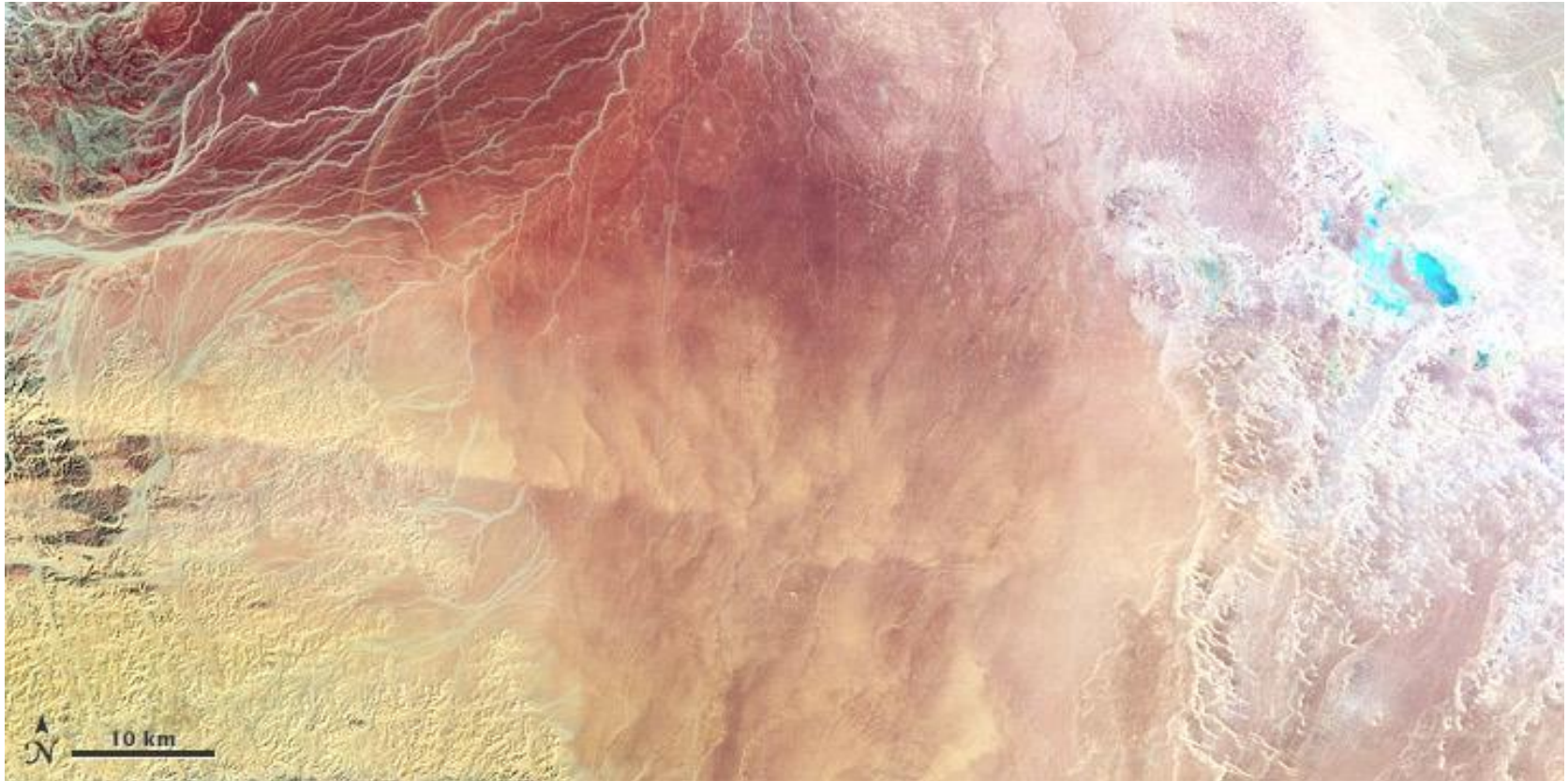
## Irrigation in arid climates

The development of modern irrigation has enabled many nations to make a move towards self-sustainability, which wasn't possible before due to geographical location or climate. New systems and techniques, such as drip irrigation and centre pivot irrigation have made it possible to do very targeted and precise watering on the soil just around the plant or at its center. These nations source their water either from deep underground water sources or from diverted flowing rivers.

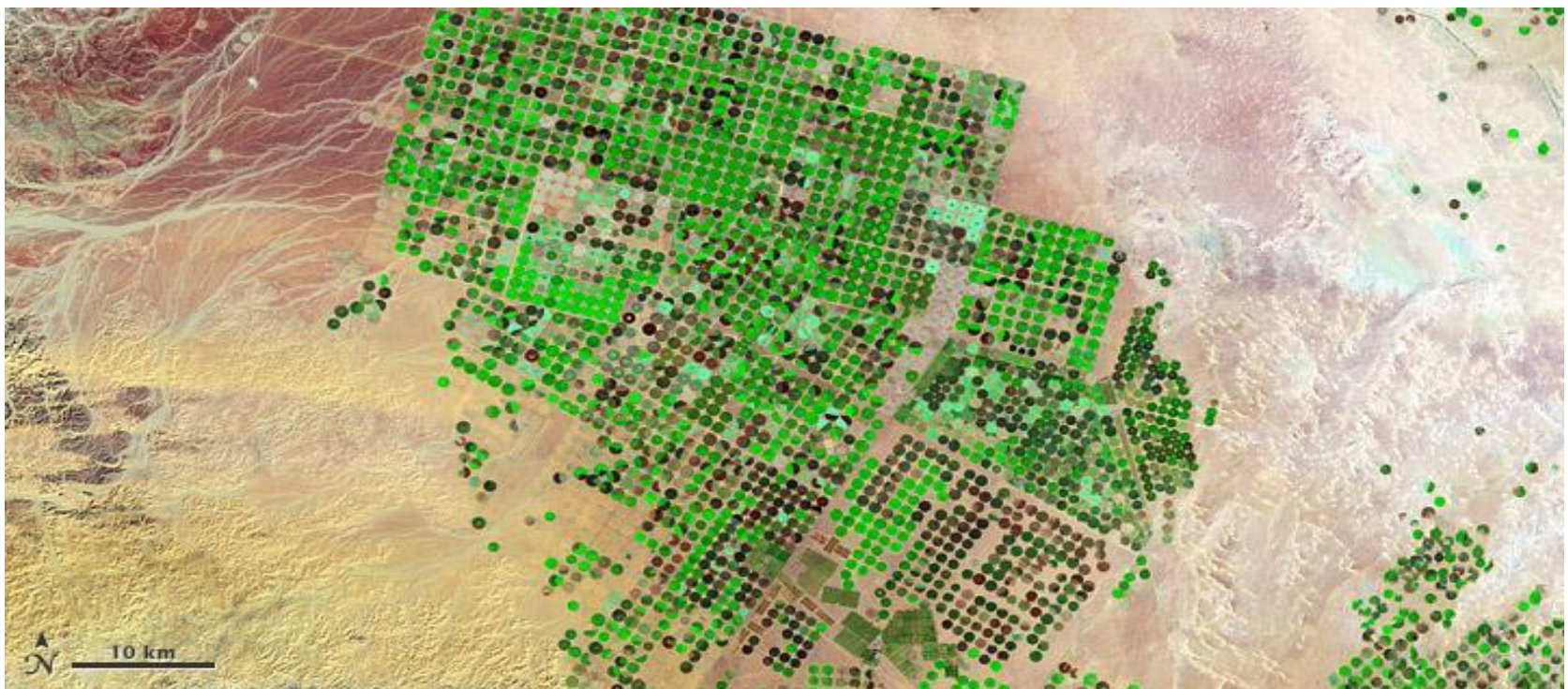
### *Example : Saudi Arabia*

A clear example of this use is in Saudi Arabia.

Saudi Arabia is mostly desert nation in the Arabian desert, yet through centre pivot irrigation they have been able to produce some crops. This has enabled Saudi Arabia to reduce imports, and become in the short term more sustainable by themselves however the water they source is non renewable so this is not a sustainable solution. Also this kind of desert agriculture is only possible through the massive government subsidies that are given to farmers from the Saudi's massive oil fortune. As we can see if irrigation is a possible way to reduce food insecurity, it is not sustainable. That's why a balance should be reached between massive irrigation and water scarcity



*This is an image of a part of the Saudi Arabian desert where we can see virtually no agriculture in 1987.*



*This is the same area in 2017, where we can see that the centre pivot irrigation developed the agriculture)*

## Concerned countries

### Africa

Based on a study of the FAO of three small-scale operation in Burkina Faso, Mali and the United Republic of Tanzania, it has been found that irrigation improved diets and health. Moreover, the action taken by the FAO in those countries permitted to create dams, wells and canals which helped the village to increase its cultural productivity and to allow people to have more money to overcome with “hungry periods” during the year.

### China

In 2010, China became the country with the largest irrigation area equipped for 69.4 million ha, overtaking India which ranked first for over 50 years.

### Colombia

The Instituto Colombiano De Hidrologia Meteorologia Y Adecuacion de Tierras (HIMAT) is an organization charged to promote irrigation programs by subsidising technological development, this has set a precedent for neighboring countries on a model to possibly follow.

In Colombia the realisation of these programs would increase the surface available of 40%.

### Sweden

Sweden has no major problems with water scarcity or drought, but there can be temporary shortages of water in the southeast of Sweden during warm and dry summers. The accuracy of the existing information on water use for irrigation in agriculture is low in Sweden. This is why Sweden strongly opposes EU irrigation subsidies and believes that is taking too much importance over the environment in general.

### Morocco

Irrigated agriculture in Morocco, although it occupies only 15% of the cultivated area, it contributes to about 45% of agricultural value added for 75% of agricultural exports. This shows the importance of Moroccan irrigation in their agricultural economy, they show a lot of support for irrigational movements and are very open to new techniques.

## Recent developments

Since 1993, March 22 is designated by the United Nations General Assembly as World Water Day. This day is about taking action to face the water crisis.

In the Sustainable Development Goals a target to ensure everyone has access to safe water by 2030 had been launched, making water a key issue in the fight to eradicate extreme poverty and thus increase food security

## The UN's implication

The UN has always helped financially countries to be able to fulfill their needs. Moreover The Assembly has recognized the right to water as a fundamental right and that it is the first step to a decent life.

Besides the FAO (Food and Agriculture Organisation of the United Nations) and the WWC (World Water Council) wrote a paper in 2015 about the fact that water is used in agriculture and uses more than the half of the water resources. Thus, a solution has to be found to save them, because agriculture remains an important determinant of economic growth, poverty reduction and food security.

## Possible solutions

Giving food to countries is not a sustainable solution, that's why the help of big companies and northern states could be necessary for countries in need to become independent. This help could be economic, but there also is human issues, that's why knowledge to guarantee a good use of the means already set in the country, and the means that may be installed, is essential.

Besides, there is wastewater which should not be looked as something to ignore. Indeed it has to be seen as a valuable resource used for the benefit of people. Waste water can be reuse for example, to irrigate field. But this is more installations, and technologic means to set, which involves financial aspect.

## Sitography

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