FEEDING THE WORLD THANKS TO PRODUCTIVIST AGRICULTURE :
A DOUBLE-EDGED SOLUTION

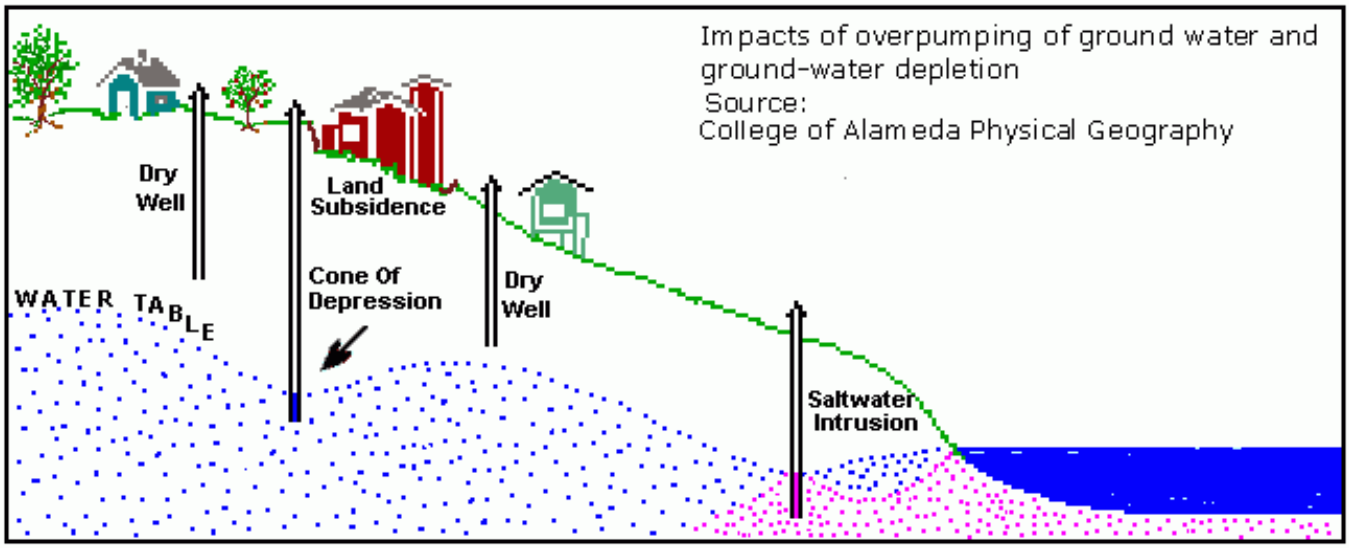
1) An agriculture which produces specific landscapes

Soya harvest in Matto Grosso region in Brazil, March 2012, AFP.

Poultry indoor breeding in western France

2) An agriculture which uses chemical inputs and irrigation

Fertilisers spreading on a field by an airplane in the USA



http://water.usgs.gov/edu/gwdepletion.html

3) Performances in Western countries and in India

Anglo-Saxon agricultural performances

	Australia	Canada	New Zealand	United Kingdom	United States
Area (m sq km)	7,7	10	0,270	0,244	9,6
Arable land (m ha)	48,3	45,8	1,39	5,7	176
Wheat[1]	6	7	-	11	3
Sheep[1]	2	-	6	7	-
Milk[1]	14	19	8	7	1
Bovine meat export[1]	1	4	5	-	2
GM-planted area (% world)	0,7	9,7	Not allowed	Not allowed	69,4
Share of agriculture in GDP[2] (%)	3,1	2,5	6	1	1,7
Caloric supply per capita per day 2002	3054	3590	3220	3400	3780

1. Rank in world production.
2. Gross Domestic Product.
Source : FAO and CNUCED 2002 and 2003

The Green Revolution, a necessity for India

WORD BOX
Malnutrition/ hunger/ famine
Population pressure: *pression démographique*
Buffer stock [ˈbʌfəˌ stɒk]: *stocks régulateurs*
Grain = cereals
Wheat, barley, rice, corn: *blé, orge, riz, maïs*
The span = period
Raw material ≠ manufactured goods
Resilience = new effort
Stress = effort, emphasis
Value addition: *valeur ajoutée*
m = million
m T = million tons
m L = million litres

FACTFILE *The world's worst recorded food disaster, known as the Bengal Famine, happened in 1943 in British-ruled India. An estimated four million people died of hunger that year alone in eastern India (that included today's Bangladesh). The Prime Minister of newly-independent India, Jawaharlal Nehru, said early in 1948, "everything else can wait but not agriculture". This awareness led to the government-inspired Green Revolution in order to increase yield, essentially during the period 1967-1978.*

DOCUMENT 1

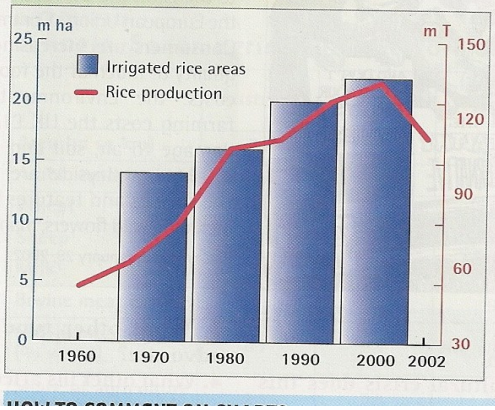
Growth of population and food production since the 1950's

	1950	1960	1970	1980	1990	2000	2004
Population (m)	361	439	548	683	846	1000	1065
Food grain production (mT)	50,8	82,0	108,4	129,6	176,4	201,8	225
Food grain import (mT)	4,8	10,4	7,5	0,8	0,3	-	-
Buffer stock (mT)	-	2,0	-	15,5	20,8	40,0	32,3
Milk production (mL)	17	20	22	35	55	75	88

Source: Indian Institute of Science

DOCUMENT 2

Irrigation: the cornerstone of the Green Revolution



DOCUMENT 3

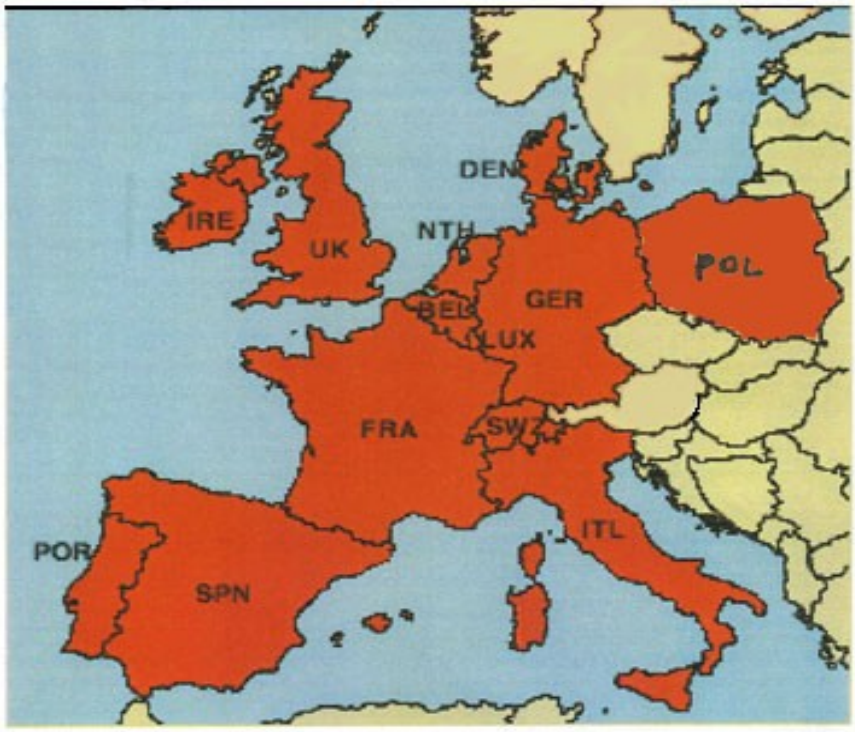
The stages of the Green Revolution

"The span of 50 years can be divided into four segments, as the ICAR's[1] Assistant Director-General, Dr Mruthyunjaya, says: 'Up to the mid-60s, the national aim was to increase food production to manage famines and supply raw material to industry. In the mid-60s and 70s, self-sufficiency in food grain production and effective food grain distribution and management was achieved. In the 80s, there was resilience in food grain production, stress on diversification, poverty alleviation and rural employment. In the 90s, the talk revolved around food and nutritional security, sustainability, post-harvest technology and management, value addition and exports'."
The Tribune of India, January 6, 2001.

1. Indian Council of Agricultural Research.

3) <u>Excesses of the productivist agriculture: the "mad cow disease" and the Green Revolution drawbacks</u>

a) Geography of the epizootic disease:



The mad cow disease epidemic has spread across Europe. All of the countries in red have reported the presence of BSE in their cattle herds.

b)

What is mad cow disease?

Mad cow disease, or bovine spongiform encephalopathy, is a neurological disorder in cattle. It is caused by an abnormal protein called a prion that infects a cow's central nervous system and causes brain and nerve cells to die. Prions are passed to humans through consumption, and that can trigger the human form of the disease.

Prion molecule

How it spreads from cows to humans

1 Person eats contaminated food. Prions are found primarily in brain or spinal cord tissue from infected animal.

2 After a person ingests infected meat, prions spread to the brain through the body's lymph nodes and immune system, where they can remain dormant for years.

3 Disease attacks nervous system. Outer layer of brain develops tiny holes, looks spongy. Host goes into seizures; death may occur.

Prevention

Eradication: Infected farm animals are destroyed.

Regulations: Animal products containing brain or central nervous system tissue aren't used as livestock feed.

Consumers: Avoid beef that contains parts of the cow's main nervous system. Prions are heat resistant, so cooking the meat will not reduce the risk.

Sources: Associated Press, McClatchy-Tribune

BAY AREA NEWS GROUP

WORD BOX
Efficiency/intensive farming
Indoor-breeding ≠ free range rearing
BSE or "mad cow disease": *ESB ou « maladie de la vache folle »*
An epizootic disease: *une épizootie, épidémie qui touche les animaux*
Foot-and-mouth disease: *la fièvre aphteuse*
Organic farming: *agriculture biologique*
Veggies = vegetables
Tofu = food made from soybean
Swathes: *espaces*
To qualify for = to earn the right to
The income: *le revenu*
Chemicals/herbicides/pesticides/fertilisers

FACTFILE *Since the 1980s British animal husbandry has been hit by epizootics. BSE affected cattle through contaminated animal feeds. Crossing the species barrier it has become a lethal disease for man (Creutzfeld-Jacob disease). In 2001 an extremely contagious foot-and-mouth epizootic led to the slaughtering of 6.5 million animals. From 1995 to 2002 British farmers saw their average income divided by three.*

DOCUMENT c

Questioning the methods of intensive breeding (Cartoon by Kal, *The Economist*, 2004.)

DOCUMENT d

English farming deemed "unsustainable"

"British farmers are deeply demoralised by the damage caused by foot-and-mouth, and by the continuing tragedy of BSE ('mad cow disease') and its human counterpart, variant Creutzfeldt-Jakob disease. Many are suffering economically and in other ways, despite the £2bn the UK receives in direct payments under the European Union's Common Agricultural Policy (CAP). Consumers are increasingly concerned about the quality of much of the food produced and its indirect costs: the Environment Agency says intensive farming costs the UK £1.5bn ($2.1bn) annually in damage to air, soil and water. And wide swathes of the countryside are now devoid of many of the species and features familiar a generation ago, including wild flowers, mammals, birds and hedgerows."

BBC web site, January 29, 2002.

e)

The future of the Green Revolution in question

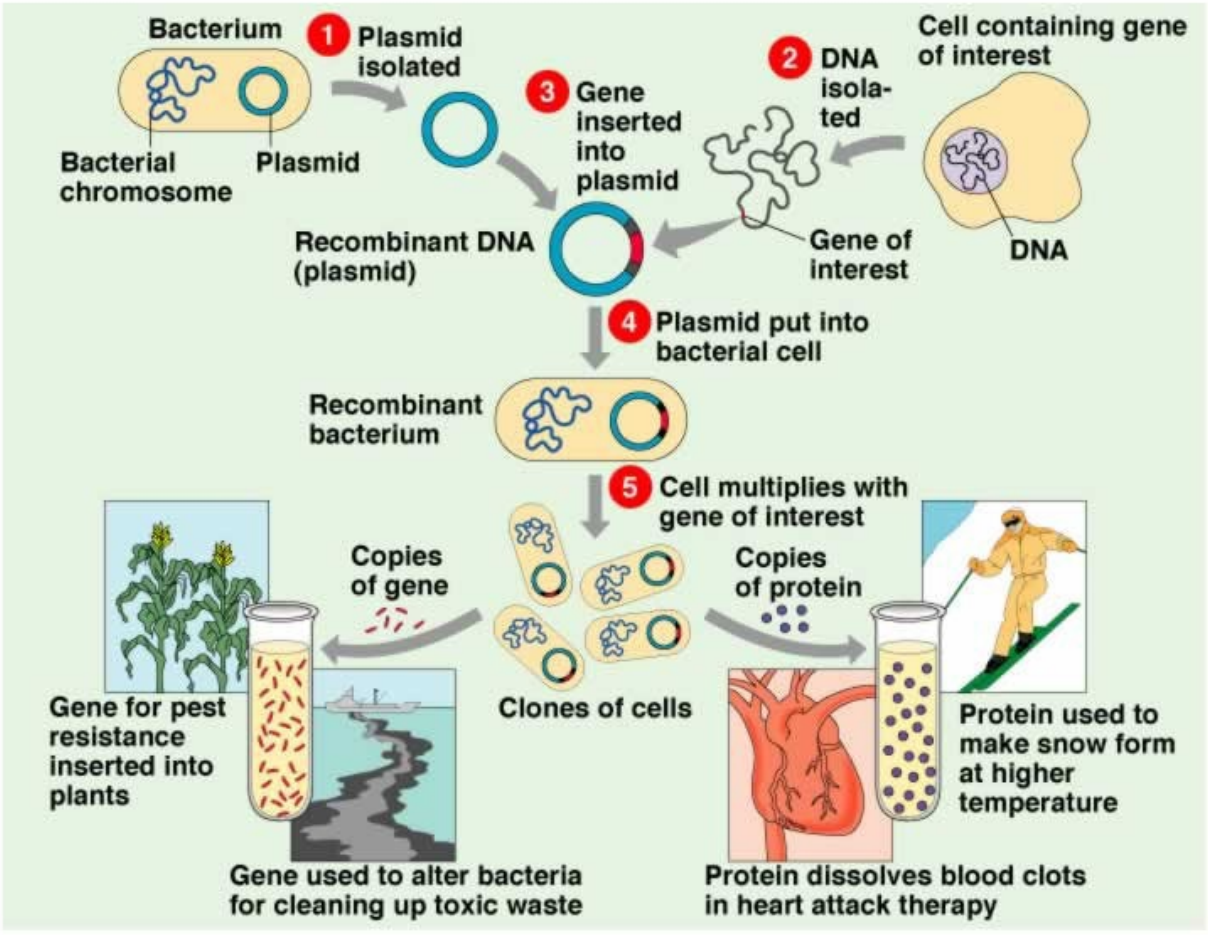
"The Green Revolution has thrown up its own set of problems. There has been a toll on soil fertility. The HYVs call for heavy dosages of chemicals — fertilisers and pesticides. Prolonged use of these has depleted our soils and poisoned our environment. The once thrifty farmer has become a profligate user of power and water. [...] Therefore, while India's food problem may have been solved, not so the hunger problem of its poor. The profits of the Revolution have not spread evenly in society and the poor have little means to buy the huge stocks with the government. Worst of all, yields are beginning to fall. [...] So, India is at a crossroads again. Which road is it to take? A tempting sign points to transgenic crops, also known as genetically modified [GM] crops. [...] But there are many sober voices that dispute these claims. Their views too are justified because in the past, multi-national companies have hastily jumped in to reap their profits with dubious products leaving the farmer to harvest sorrow. [...] The more sensible road to take is the one to eco-sensitive farming. India needs to re-evaluate proven, ancient ways of harmoniously maintaining soil fertility. Dependence on chemicals has to be minimised. Esteem for carefully selected native strains has to be encouraged if the small farmer is to be freed from malevolent seed companies. Conservation and optimal use of water is an important issue. [...] There are signs of an emerging awareness all around. Many farmers in Kerala and Karnataka are turning to organic farming on a large scale. Most significantly Swaminathan, that star of the Green Revolution, is today an advocate of 'sustainable agriculture.'"

Good News India, November 2002.

Your task: First, explain what are the benefits provided by a productivist agriculture, using and analysing the proper documents. Then, find and analyse the right documents to explain the doubts and dangers raised by such an agricultural model on environment and human health.

USING SCIENCE TO FEED THE WORLD

1) Genetic engineering principle



http://www.anselm.edu/homepage/jpitocch/genbio/geneticsnot.html

2) Genetic Modified Food : Monsanto Empire

An Overview of the Safety and Advantages of GM Foods

Like you, Monsanto employees care about the food we buy at the store and feed to ourselves and our loved ones, and we are committed to developing products that contribute to safe and nutritious food choices. We place the highest priority on the safety of our products and conduct rigorous and comprehensive testing on each. In fact, seeds with GM traits have been tested more than any other crops in the history of agriculture – with no evidence of harm to humans or animals. In addition, governmental regulatory agencies, scientific organizations and leading

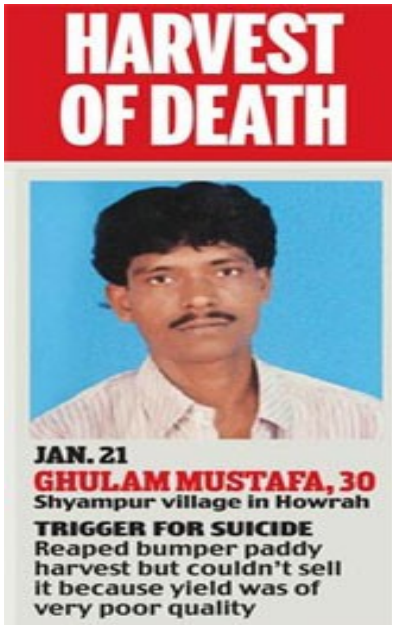
health associations worldwide agree on the safety of GM crops. As a seed company, Monsanto employees breed, grow and sell seeds to farmers around the world. Because many of the foods we eat and products we use every day begin as seeds, the safety of each of Monsanto's seeds – whether GM or conventional – is a top priority to each of us. After 30 years of research and assessments, the safety of GM crops is supported strongly by scientific evidence and the conclusions of the global scientific community. In fact, GM crops have been reviewed and tested more than any other crops in the history of agriculture and have been shown to be as safe as conventional crops.

http://www.monsanto.com/newsviews/pages/biotech-safety-gmo-advantages.aspx

3) Indian suicides

Indian Farmers Committing Suicide as a Result of Monsanto's GM Crops

Monsanto's GM crops were supposed to feed the world hunger and starvation but instead the diverse sustainable organic agriculture was replaced with globalization, GMO crop failures and its threat to environment and human's health, monopoly, farmer's suicide and world wide control of seeds. Every 30 minutes an Indian farmer commits suicide as a result of Monsanto's GM crops. In the last decade more than 250,000 Indian farmers have killed themselves because of Monsanto's costly seeds and pesticides. Globalization and monopoly have forced farmers to buy GM seeds and since GM crops have become pests' resistance, the farmers have no choice but to purchase Monsanto's pesticide. Sometimes GM crops fail over and over again; GM crops also do not grow back again next year and every year farmers have to buy new seeds. In 2008 Daily Mail called the continuous suicide of Indian farmers a "genocide" in human history. What's really disturbing is that often time farmers commit suicide by drinking the insecticide shipped to them by Monsanto. After use of Monsanto's BT cotton in 2002 the rate of suicide in Indian farmers increased drastically. 90% of Indian cotton farmers changed to Monsanto's Bt crop hoping that Bt crop are pest resistant and they do not have to buy pesticides. However after a while Bt cotton's pests resistant quality started fading away and pests adapted so farmers had no choice but to buy and use Monsanto's pesticides. The fact that farmers have to buy new seeds every year, the costly use of GM seeds, use of pesticides and great reduction in crop value have often times left farmers bankrupt and as a result many farmers are falling into the endless cycle of debt, depression, hopelessness and despair and they have no choice but to ends their lives. The figures provided by NY University School of Law show that just in 2009 alone, 17,638 of farmers committed suicide.



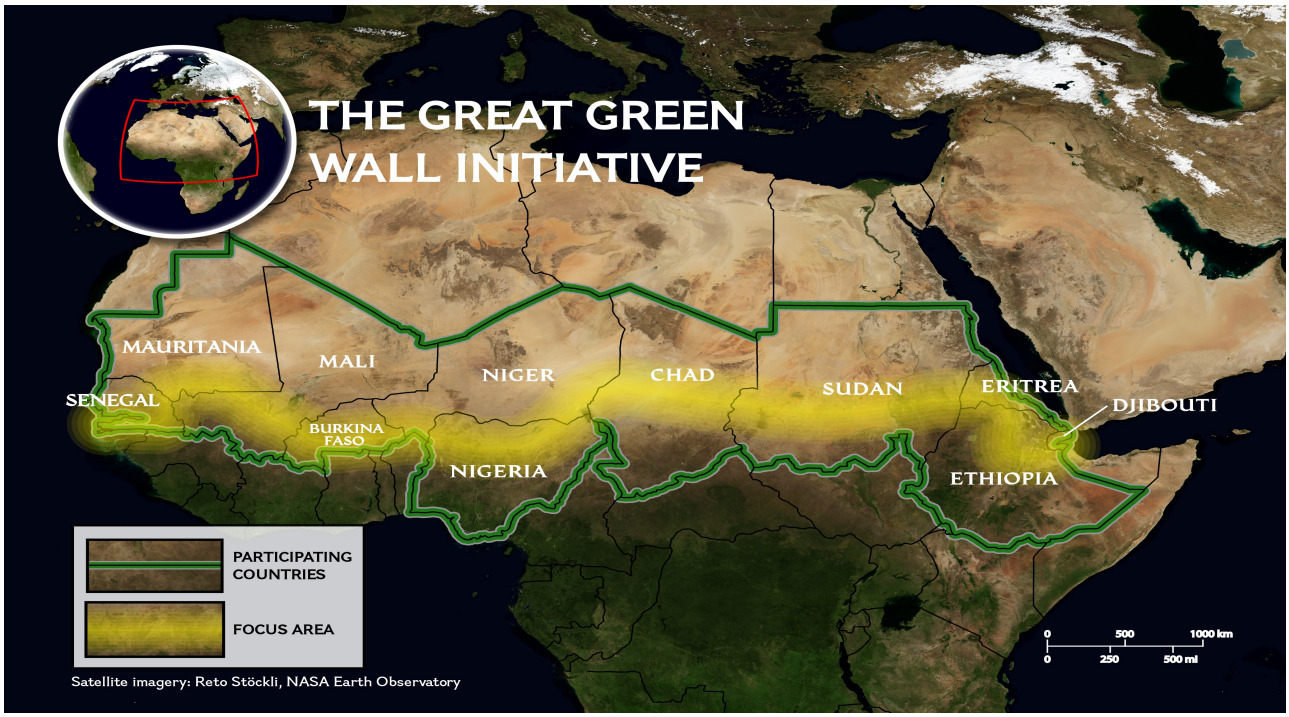
http://www.seattleorganicrestaurants.com/vegan-whole-foods/indian-farmers-committing-suicide-monsanto-gmcrops/#

Your task: Analyse the 3 documents to explain to what extent Genetics can help feeding the world. In a first part, explain the scientific principle used to give birth to HYV but underline also in a second part its drawbacks with the example of the US firm Monsanto.

TESTING OUT A SUSTAINABLE AGRICULTURE

At a regional scale, a sustainable experiment: the *Great Green Wall* in Africa

a) A presentation



In Africa, scientists are hard at work restoring land once rich with biodiversity and vegetation. Eleven countries in the Sahel-Sahara region—Djibouti, Eritrea, Ethiopia, Sudan, Chad, Niger, Nigeria, Mali, Burkina Faso, Mauritania, and Senegal—have joined to combat land degradation and restore native plant life to the landscape. In recent years, northern Africa has seen the quality of arable land decline significantly due to climate change and poor land management. Uniting under the banner of the "Great Green Wall" initiative, national and regional leaders hope to reverse this trend. The bulk of the work on the ground was originally slated to be concentrated along a stretch of land from Djibouti, in the east to Dakar, Senegal, in the west—an expanse 15 kilometers (9 miles) wide and 7,775 kilometers (4,831 miles) long. The project has since expanded to include countries in both northern and western Africa. Land degradation typically stems from both human-related and natural factors; overfarming, overgrazing, climate change, and extreme weather are the most common causes. Beyond affecting land and the natural environment, land degradation poses serious threats to agricultural productivity, food security, and quality of life. Nowhere is this issue more urgent than in sub-Saharan Africa, where an estimated 500 million
people live on land undergoing desertification, the most extreme form of land degradation. Jean-Marc Sinnassamy is a senior environmental specialist with the Global Environment Facility (GEF). He helps manage a program developed under the Great Green Wall initiative with countries in the Sahel and West Africa. The GEF has been with the initiative since the beginning, helping to convene country leaders at the headquarters of the United Nations Convention to Combat Desertification in Bonn, Germany, in February 2011. The World Bank and other organizations focused on global development and the environment provide

financial and technical support. For Sinnassamy, the partnership represents a unique opportunity to work across the region with a solid political base. “Here, we saw political leaders, heads of state, ministers in different countries wanting to work on common environmental issues and wanting to tackle land degradation issues together,” he says. “. . . For us, this is a political blessing. We have to respond to this demand, and we have to capitalize on that.” Beyond the project’s strong political foundation, its carefully crafted approach brings environmental benefits both locally and globally. The initiative uses an “integrated landscape approach” that allows each country to address land degradation, climate change adaptation, biodiversity, and forestry within its local context. “In this case, working to combat land degradation is the best way to address both very local issues and improve the global nvironment,” Sinnassamy says. “We are working with the land, which is the basis of livelihood in these communities. We are working with people to improve soil quality, which improves crop yield and in turn agricultural production and the overall quality of life in the community. These very local benefits are also a way to generate global benefits for water, land, and nature.” In the end, Sinnassamy hopes the region as a whole will be composed of a “mosaic of landscapes” that increases biodiversity and maintains native flora as part of agricultural land. Each participating country has its own individual goals, which include reducing erosion, diversifying income, increasing crop yield, and improving soil fertility. While trees and forests are only part of the focus of the Great Green Wall initiative, many in the media have cast the project as solely a tree-planting project and an attempt to halt the southward expansion of the Sahara Desert. Sinnassamy is quick to point out two faults in this perception. The first is that the Great Green Wall initiative is much more nuanced than simply planting a belt of trees across the continent. “Behind the name or the brand ‘Great Green Wall,’ different people see different things. Some people saw just a stripe of trees from east to west, but that has never been our vision,” he says. “In Niger, Mali, and Burkina Faso . . . natural regeneration managed by farmers has yielded great results. We want to replicate

and scale up these achievements across the region. It’s very possible to restore trees to a landscape and to restore agroforestry practices without planting any trees. This is also a sustainable way of regenerating agroforestry and parkland.”

The second misperception Sinnassamy points to is that the Sahara Desert is not, in fact, expanding. “We are not fighting the desert,” he says. “In the majority of the areas we are working in these 11 countries, the desert is not advancing. The [Sahara] Desert is a very stable ecosystem. Of course, there are some areas on the margins—for instance in Senegal, Mauritania, and Nigeria—where there are some sand movements. But from a geographic perspective, over time the desert has been relatively stable in this area.” (...) Examples of success include more than 50,000 acres of trees planted in Senegal. Most of these are the acacia species *Senegalia senegal*, which has economic value for the commodity it produces, gum arabic. (Gum arabic is primarily used as a food additive.) A small portion of the trees are also fruit-bearing, which, when mature, will help combat the high levels of malnutrition in the country’s rural interior. Even more dramatic is the project’s potential social impact. The BBC reports that the improvements in land quality and economic opportunity in Mali may help curb terrorism in the country, where famine and poverty have exacerbated a spike in political and religious extremism.

By Ryan Schleeter, Monday, November 4, 2013

http://education.nationalgeographic.com/education/news/great-green-wall/

b) *The agroforestery benefits*

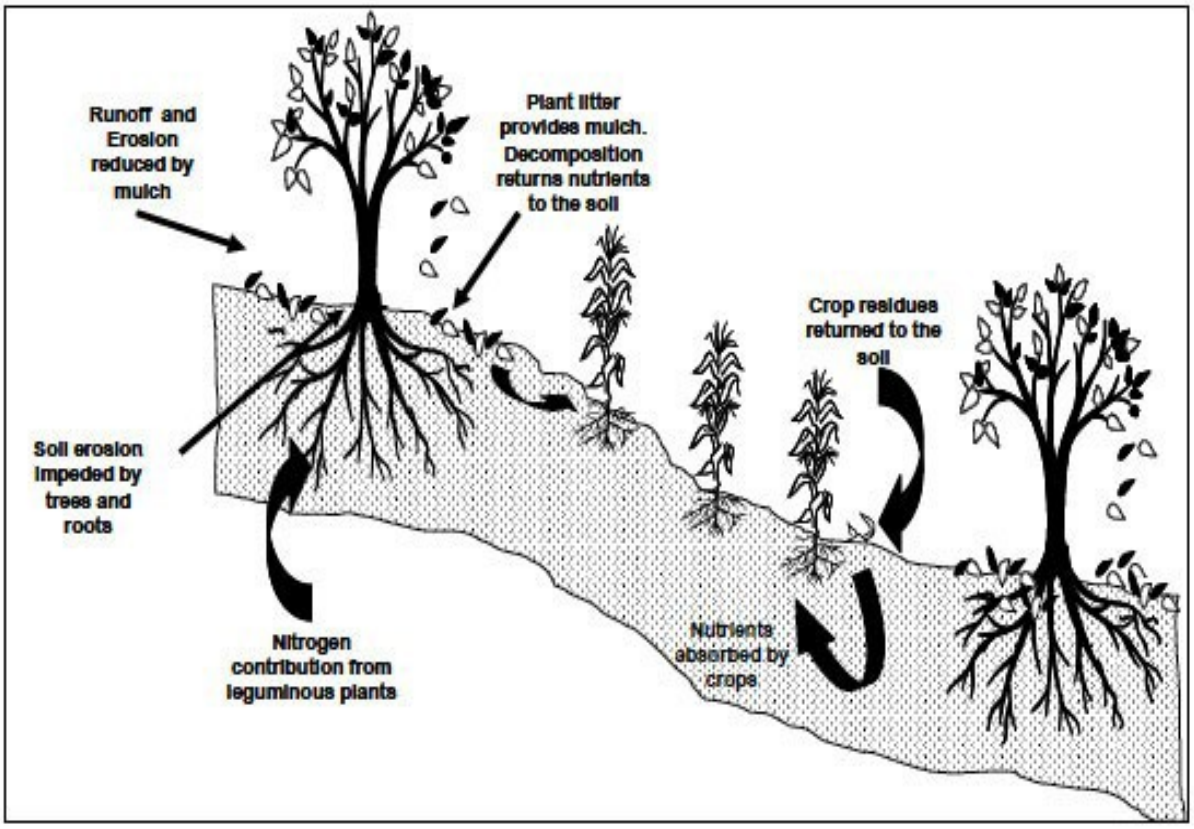


Figure A schematic representation of the potential benefits of introducing an agroforestry system on ecosystem functioning

http://www.scielo.org.za/scielo.php

Your task: Analyse the 3 documents to explain to what extent the Great Green Wall initiative is sustainable. In a first part, explain the scientific principle used to improve the ecological quality of arable land of the Sahara-Sahel region. Then, describe, with a critical eye, the first results of such an experiment.

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TESTING OUT AN ORGANIC FARMING

At a local scale, an organic experiment: Fir Tree Farm, England, near Liverpool

Your task: First, sum up the story of this comics. Then, define what are the rules established by the European Union to get the logo for organic products. Finally, try to explain why the European Commission chose Fir Tree Farm as an organic model of farming, remembering the 1980s...

To download the comics: http://ec.europa.eu/agriculture/organic/downloads/brochures/index_en.htm

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