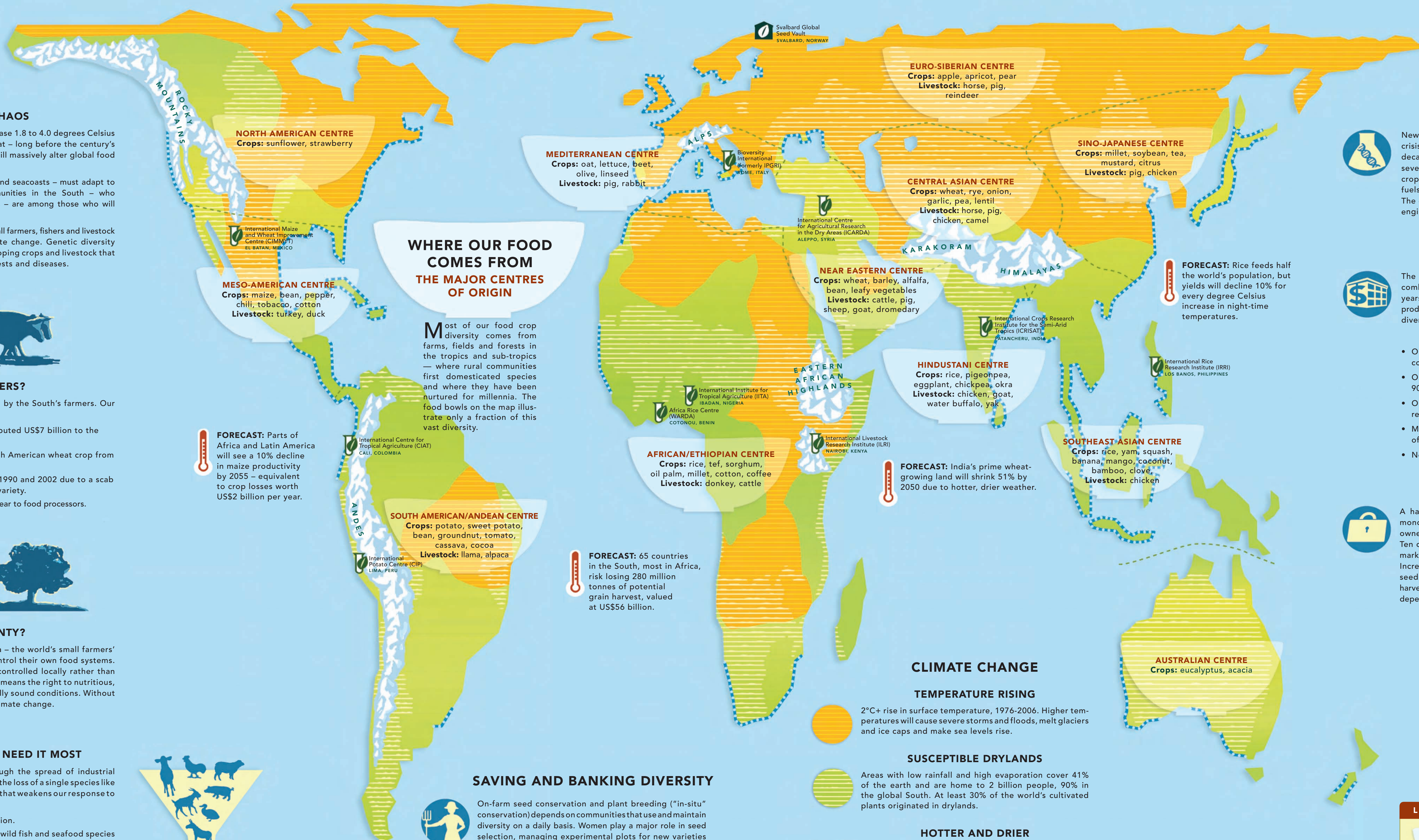


# The Seed Map

## FOOD, FARMERS AND CLIMATE CHAOS

The way to safeguard our food supply in the midst of climate chaos is by using and adapting the plant and animal genetic diversity that rural peoples have bred and nurtured over 10,000 years. Most of this diversity is in the global South – who have contributed least to global greenhouse gas emissions – are among those who will suffer most. But rural communities are under intense threat from industrial farming, agro-chemical monopolies, the North's trade policies and technological fixes.



### FOOD AT RISK

#### CONFRONTING CLIMATE CHAOS

By the end of this century, the Earth's temperature will increase 1.8 to 4.0 degrees Celsius and average sea levels will rise dramatically. This means that – long before the century's end – our planet is headed for a biological meltdown that will massively alter global food production.

**AGRICULTURE** – especially in drylands, mountain regions, and seacoasts – must adapt to dramatically different growing conditions. Farming communities in the South – who have contributed least to global greenhouse gas emissions – are among those who will suffer most.

**THE GUARDIANS OF BIODIVERSITY** – more than a billion small farmers, fishers and livestock keepers – are key to adapting our food systems to climate change. Genetic diversity created by them is the world's most vital resource for developing crops and livestock that can survive hotter, drier conditions and resist migrating pests and diseases.



#### WHO NEEDS SMALL FARMERS?

Agriculture still depends on the genetic diversity nurtured by the South's farmers. Our dependence will increase with climate chaos.

- In the mid-1990s the South's crop genes annually contributed US\$7 billion to the \$18 billion US maize crop.
- Genes from Mexican farmers' varieties rescued the North American wheat crop from stem rust in the 20th century.
- US wheat and barley farmers lost US\$3 billion between 1990 and 2002 due to a scab disease. The only defence has been found in a Chinese variety.
- Genes from an Andean tomato are worth US\$8 million per year to food processors.

**FORECAST:** Parts of Africa and Latin America will see a 10% decline in maize productivity by 2055 – equivalent to crop losses worth US\$2 billion per year.

### WHERE OUR FOOD COMES FROM THE MAJOR CENTRES OF ORIGIN

Most of our food crop diversity comes from farms, fields and forests in the tropics and sub-tropics – where rural communities first domesticated species and where they have been nurtured for millennia. The food bowls on the map illustrate only a fraction of this vast diversity.

**FORECAST:** 65 countries in the South, most in Africa, risk losing 280 million tonnes of potential grain harvest, valued at US\$56 billion.

### CLIMATE CHANGE

#### TEMPERATURE RISING

2°C+ rise in surface temperature, 1976-2006. Higher temperatures will cause severe storms and floods, melt glaciers and ice caps and make sea levels rise.

#### SUSCEPTIBLE DRYLANDS

Areas with low rainfall and high evaporation cover 41% of the earth and are home to 2 billion people, 90% in the global South. At least 30% of the world's cultivated plants originated in drylands.

#### HOTTER AND DRIER

Susceptible drylands that have also experienced a 2°C+ rise in surface temperature, 1976-2006. Crop yields will drop dramatically where dryland agriculture depends completely on rain.

#### MOUNTAIN REGIONS

Climate change means more precipitation at high altitudes. Climate extremes will lead to more plant disease and pest outbreaks.

#### COASTAL COMMUNITIES THREATENED

Rising sea levels threaten more than 630 million people who live on coastal lowlands – where two-thirds of the world's largest cities are located.

### THE CORPORATE THREAT

#### CLIMATE JUSTICE, NOT TECHNO-FIXES

New technologies are being promoted as a quick-fix for the climate crisis. Techno-fixes do not address social inequities. Over the next decade, the market for agrofuels (crop-based energy sources) will grow seven-fold and is already shifting marginal lands from food to fuel crops. Rather than being a "green" response to climate change, agrofuels risk destroying biodiversity and compromising food sovereignty. The oil industry is now investing in synthetic biology (extreme genetic engineering) to create artificial life forms for fuel production.

#### GENETIC DIVERSITY OR GENETIC ENGINEERING?

The biotech industry promotes genetically engineered (GE) crops to combat climate change and feed hungry people. Yet, more than 10 years after GE seeds were first planted, they have not increased food production, just company profits. Contamination from GE crops threatens diversity in farmers' fields.

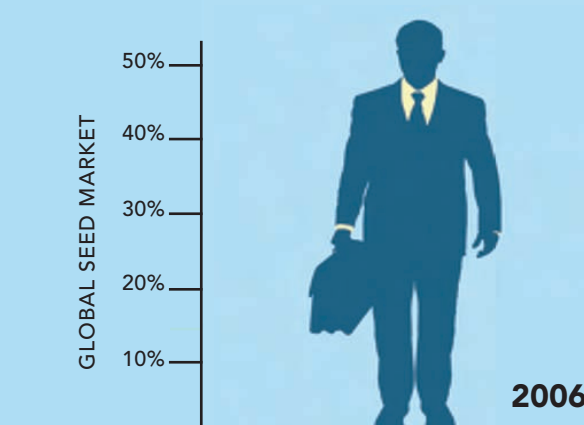
#### AFTER TEN YEARS OF GE CROPS

- Only 4 industrial GE crops commercialized (maize, soybean, canola, cotton).
- Only 4 countries (USA, Canada, Argentina, Brazil) account for over 90% of the global GE crop area worldwide.
- Only two GE traits commercialized – pesticide tolerance and insect resistance.
- Monsanto's GE seeds and genetic traits accounted for almost 90% of the total area devoted to GE crops in 2005.
- No benefits for small farmers, consumers and biodiversity.

#### WHO OWNS SEEDS?

A handful of multinational seed and agrochemical corporations are monopolizing (via patents) the first link in the food chain and claiming ownership over genetic materials developed by farming communities. Ten companies control more than 55% of the world's commercial seed market and six companies control 72% of the global pesticide market. Increasingly, patents prohibit farmers from saving and exchanging seeds. Corporate labs are developing Terminator seeds that are sterile at harvest. If commercialized, Terminator will threaten 1.4 billion people who depend on farmer-saved seeds.

#### MONOPOLIZING THE FIRST LINK IN THE FOOD CHAIN



10 companies control more than 55% of the world's commercial seed market

#### WHAT IS FOOD SOVEREIGNTY?

"Food sovereignty" is the term adopted by Via Campesina – the world's small farmers' movement – to describe everyone's right to define and control their own food systems. Food sovereignty means that land and resources will be controlled locally rather than dictated by international trade regimes and agribusiness. It means the right to nutritious, culturally-appropriate food grown under just and ecologically sound conditions. Without food sovereignty, farmers cannot respond effectively to climate change.

#### WE'RE LOSING DIVERSITY WHEN WE NEED IT MOST

Crop and livestock genetic diversity have been lost through the spread of industrial monocultures and agribusiness monopolies. It is not so much the loss of a single species like rice or wheat, but the loss of genetic diversity *within* species that weakens our response to climate change.

- 20% of the world's livestock breeds are at risk of extinction.
- 75% of the world's marine stocks are at imminent risk. All wild fish and seafood species will collapse by 2048 if current trends continue. Over 100 million people rely on small-scale fishing for income and food.
- 90% of our food energy comes from only 15 plant species and 8 animal species.

Overall, we have lost at least 75% of world crop genetic diversity. We lose a unique livestock breed every month. But we are losing farm cultures twice as fast. More than half of the world's languages have become extinct over the past 100 years. When languages disappear, we also lose critical knowledge of ecosystems that could help us address climate change.

- 75% of India's rice crop is planted with a dozen varieties. Once there were 30,000.
- 80% of Mexico's maize varieties grown in the 1930s are gone.
- 90% of the 10,000 wheat varieties grown in China a century ago have been lost.
- 90% of US fruit and vegetable varieties have disappeared in the last century.
- Just four companies control breeding stock for industrial chicken broiler production worldwide, relying on an extremely narrow genetic base.



One unique livestock breed disappears every month



Crop genetic diversity is disappearing at 2% a year

### SAVING AND BANKING DIVERSITY

On-farm seed conservation and plant breeding ("in-situ" conservation) depends on communities that use and maintain diversity on a daily basis. Women play a major role in seed selection, managing experimental plots for new varieties and seed saving. Community-managed seed banks protect local food systems and allow crop diversity, associated knowledge and practices to continue evolving in their original habitat. Networks to strengthen local seed conservation and farmer breeding programs are growing. Civil society, farmers' organizations and social movements are also resisting privatization of biodiversity and challenging corporate monopoly.

Approximately 6 million seed samples are stored in temperature-controlled gene banks around the world ("ex-situ" conservation). But even high-tech gene banks fail during power outages, war or natural disaster – and collections aren't always accessible to farming communities.

In 2007, a gene bank for the world's seeds opened in Norway's Arctic – a "doomsday bank" of last resort.

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Available in French and Spanish.

**ONLINE MAP:** A digital version of this map with sources will be updated periodically at [www.seedmap.org](http://www.seedmap.org)



**LEGEND**

- Major centre of food origin/diversity
- Predicted impacts of climate change on agriculture
- Centre of food origin/diversity boundary
- International gene bank collection
- CGIAR gene bank collections (Consultative Group on International Agricultural Research)
- Areas that have experienced a 2°C+ rise in temperature between 1976 and 2006
- Susceptible drylands: low rainfall and high evaporation
- Susceptible drylands that have also experienced a 2°C+ rise in temperature between 1976 and 2006
- Coastlines most vulnerable to sea-level rise
- Major mountain ranges