

CLIMATE CHANGE AND THE FOUR DIMENSIONS OF FOOD AND ENERGY SECURITY



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WORDS MATTER

FOOD SYSTEM

A set of dynamic interactions between and within bio-geophysical and human environments that influences both activities and outcomes all along the food chain.

FOOD CHAIN

Food system activities in the food chain:

- Production
- Storage and processing
- Distribution
- Acquisition
- Preparation and consumption

FOOD SECURITY

When all people at all times
have physical or economic access
to sufficient, safe and nutritious food
to meet their dietary needs and food
preferences for an active and healthy life.

FOOD SECURITY

The outcome of food system performance at all levels –

- ~ global,
- ~ national, and
- ~ local.

BIOMASS AND BIOFUEL

BIOMASS

Material of biological origin (excluding material embedded in geological formations and transformed to fossil).

BIOFUEL FEEDSTOCKS

Organic materials used in the production of liquid and gaseous biofuels.

BIOFUEL AND BIOENERGY

BIOFUEL

Any fuel produced directly or indirectly from biomass, whether solid, liquid or gaseous.

BIOENERGY

Energy produced from various biofuels.

Wood energy: Energy derived from fuelwood, charcoal, forestry residues, black liquor and any other energy derived from trees.

Agro-energy: Energy derived from crops purposely grown for energy and from agricultural and livestock by-products, residues and wastes.

ENERGY SECURITY

“Safety and certainty in oil.”

First Lord of the Admiralty Winston Churchill,
on the eve of World War I.

Protection against disruption in energy supplies due to:

- extreme weather or accidents,
- short-term supply-demand imbalances in the markets,
- regulatory failures,
- exposure to resource concentration risks in fossil fuel markets.

Paraphrased from IEA, 2007. *Energy Security and Climate Policy*, Executive Summary.

ENERGY SECURITY

When all peoples at all times have physical or economic access to sufficient, safe and sustainable sources of energy

~ to meet their household energy needs

~ and the energy needs of their national economies

~ at a level that ensures stable and equitable growth.

DIMENSIONS OF FOOD AND ENERGY SECURITY

- Availability
- Stability
- Accessibility
- Utilization

CLIMATE AND CLIMATE SYSTEM

CLIMATE– characteristic conditions of the earth's lower surface atmosphere at a specific location

CLIMATE SYSTEM – earth system dynamics that produce weather

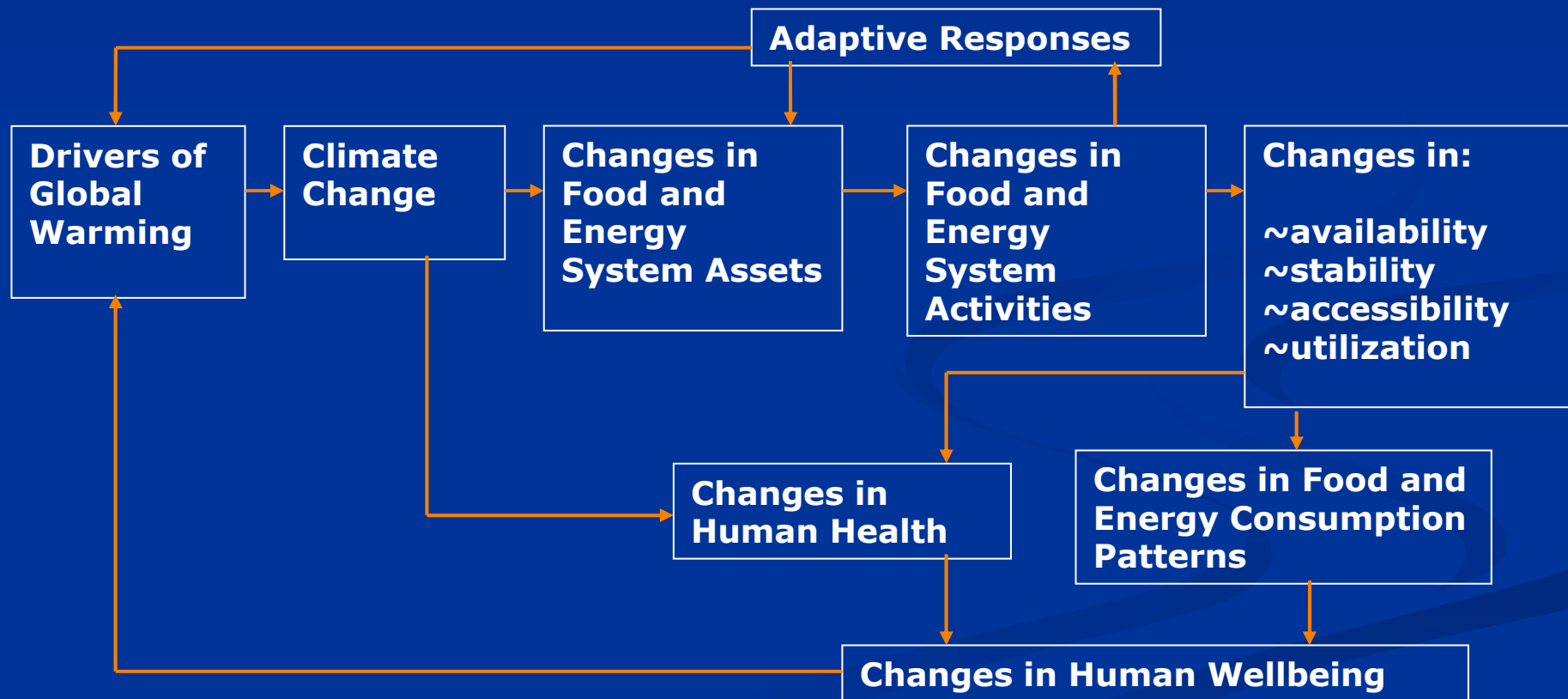
CLIMATE CHANGE AND GLOBAL WARMING

CLIMATE CHANGE – variation over time in the earth's global climate or in regional climates, caused by both natural forces and human activities

GLOBAL WARMING – increase in global mean temperatures that is likely to produce dramatic changes in the climate system

CLIMATE CHANGE IMPACTS

CHANGE PATHWAYS



IMMEDIATE FOOD AND ENERGY SYSTEM IMPACTS

- Food production losses – global market impact uncertain; local declines certain
- Infrastructure damage
- Rising transport, food preservation and cold storage costs
- Increase in uninsured asset losses
- Increased livelihood risks
- More food emergencies
- New vectors for plant and animal pests and diseases
- Human health risks

FORESEEABLE LONGER-TERM IMPACTS

- Climate-induced losses
- Climate-induced changes, both positive and negative
- Disruptive economic and social impacts

ALL ECOSYSTEMS ARE AT RISK

- Urban
- Marine
- Coastal, including low-lying river deltas
- Inland water and floodplains
- Forest
- Dryland
- Island
- Mountain
- Polar
- Cultivated

AFFECTED GROUPS

- Small-scale farmers, pastoralists, forest-dependent people, fishers, aquaculturalists
- The urban poor
- Persons subject to pre-existing socio-economic discrimination
- The uninsured

CLIMATE CHANGE, AGRICULTURE AND FOOD SECURITY

- Agriculture, forestry and fisheries are sensitive to weather and climate.
- Impact of climate change on food production will affect food availability at all levels.
- Impact of climate change on agricultural production will affect livelihoods and ability to access food.

MITIGATION AND ADAPTATION

AGRICULTURE - AN IMPORTANT EMITTER OF GREENHOUSE GASES

Contributions of agriculture to emissions

- Agricultural activities – 13.5 %
 - of which livestock – 6 %
- Deforestation – 17.4 %
 - of which livestock – 12%

IMPORTANCE OF AGRICULTURE FOR MITIGATION

Emissions reduction

- Improved forest management
- Improved livestock management
- More efficient management of irrigated rice

Carbon sequestration

- Afforestation and reforestation
- Conservation agriculture
- Improved grazing land management

ADAPTATION AND MITIGATION GO HAND-IN-HAND

Adaptation measures can:

- Reduce risk
- Strengthen resilience
- Ease transitions
- Reduce emissions
- Sequester carbon

KEY ACTION DOMAINS FOR PROTECTING FOOD AND ENERGY SECURITY

- ~ Risk management
 - ~ Water
 - ~ Livestock
 - ~ Rice
 - ~ Energy
- ~ Dietary preferences
 - ~ Innovation

KEY ACTION DOMAINS

~ Risk management

- Infrastructure investment
- Climate and weather information
- Emergency response
- Risk insurance
- Livelihood adaptation

KEY ACTION DOMAINS

~ Water

- Adjusting the operation of large-scale irrigation and drainage systems in the short-term
 - provision of on-demand water services
 - protecting equipped areas from flood damage
 - maintaining drainage outlets
 - introducing more efficient crop water management practices
 - adjusting institutional capacities to ensure scheme performance
- Negotiating allocations and releases of water to agriculture across river basins
 - Well-targeted investments in small-scale water control facilities
 - Reducing soil evaporation through conservation agriculture
 - Planting more water-efficient and/or drought tolerant crop varieties
 - Enhancing soil fertility to increase yields per unit of water utilized
 - Decreasing runoff from cultivated land
 - Reusing wastewater for agricultural purposes.

KEY ACTION DOMAINS

~ Livestock

- Reduce energy demand and increase efficiency by shifting intensive livestock production:
 - closer to consumers in urban and peri-urban areas
 - closer to sources of feedstuffs
 - closer to transport and trade hubs for imported feed
- Reduce land demand by increasing intensification and industrialization, esp. for pigs and poultry
- Reduce land degradation and water loss with improved grazing management and integrated agro-forestry practices that also sequester carbon
- Reduce emissions with improved management of cattle feeding and manure treatment practices

KEY ACTION DOMAINS

~ Rice

- Staple for more than half the world's population
 - Grown largely (80%) by small-scale farmers
 - Employer of nearly 1 000 million rural people
- Highly adaptive – tolerant to desert, hot, humid, flooded, dry and cool conditions, and capable of growing in saline, alkaline and acidic soils.
- Currently highly demanding of water and source of methane emissions, but only two of 23 species are cultivated
- New varieties and crop management systems could increase yield, reduce production costs, enhance input and water use efficiency, and reduce greenhouse gas emissions

KEY ACTION DOMAINS

~ Energy

- Biogas
 - Second generation biofuels
- Wood fuel production in planted forests
- Helping poor people climb the energy ladder
 - Using energy efficiently
 - Reducing food miles

KEY ACTION DOMAINS

~ Dietary preferences

- Shift in staple food preferences – slow the shift to protein
- Reduce livestock product consumption, especially red meat in OECD countries
- Shift toward greater proportion of locally produced foods in the diet including from urban and school gardens
 - Increase consumption of new food items
 - Protect biodiversity and exploit wild foods
- Promote greater use of dry cooking methods to conserve water
- Promote energy efficient and hygienic food preparation practices
- Reduce reliance on refrigeration as a method of preserving food

KEY ACTION DOMAINS

~ Innovation

- Behaviors
- Institutions
- Technologies

THE UNKNOWN FACTOR