PLANET UNDER PRESSURE 2012 MARCH 26-29 LONDON

RIO+20 POLICY BRIEF #2

Food security for a planet under pressure

Transition to sustainability: interconnected challenges and solutions

PHOTO: ISTOCKPHOTO/LORENZO CODACCI

The challenge of feeding the world efficiently and equitably is considerable, but not insurmountable. Achieving food security for all, both now and in the future, depends on putting in place a strong foundation of multi-lateral and cooperative mechanisms that work across disciplines, sectors and national boundaries. Institutions operating effectively at multiple levels will be at the centre of sustainable food systems; these will need to be flexible, promote appropriate use of innovative technologies and policies, and recognize the increasingly important role of non-state actors in enhancing food systems. Above all, there is need for a strong focus on resilience, equity and sustainability. This brief sets out broad guidelines to help policy and decision makers work towards adopting a more coordinated and integrated approach to food security issues.

Rio+20 Policy Briefs

One of nine policy briefs produced by the scientific community to inform the United Nations Conference on Sustainable Development (Rio+20). These briefs were commissioned by the international conference *Planet Under Pressure: New Knowledge Towards Solutions* (www.planetunderpressure2012.net).

GLOBAL CHANGE IGBP International Geosphere-Biosphere Programme · IHDP · DIVERSITAS an international programme of biodiversity science · WCRP World Climate Research Programme · Earth System Science Partnership · ICSU International Council for Science

Summary of key points and policy recommendations

The food security challenge

- Food security is fundamentally linked to both socioeconomic systems and environmental conditions.
- Changes in climate and in other key environmental factors will significantly complicate the achievement of food security for all.
- It is imperative to reduce hunger and poverty in the context of structural shifts in demand and supply, driven by population growth, income growth and global environmental change.
- The challenges of food security, natural resource use and environmental change call for countries to renew their efforts to work together in the management of global public goods.

Adopting a food systems approach

- A food systems approach links the activities of producing, processing, retailing and consuming food with the outcomes of these activities for food security and other societal goals.
- A food systems approach can help to show how food insecurity arises and also provides a framework for policy development to meet the food security challenge.
- A food systems approach provides a framework for multi-scale, multi-level analyses of the dynamic linkages between food security, environmental concerns and development issues.
- Food trade needs to be enhanced to encourage secure access to nutritious food for the poorest and most vulnerable.
- Novel institutional arrangements together with innovating and enabling policies will promote cooperation between public and private investors in food systems.

Meeting the challenge

- Food systems of the future will need to enhance food security while minimizing further environmental degradation.
- Multiple pathways will be needed to deliver a greener economy and greener food systems; these include reducing waste at all stages of the food system and greater involvement of the private sector in planning and decision making.
- There is an urgent need to develop technologies and policies that will result in sustainable production practices.
- More integrated planning and greater cross-system coherence across the global food security agenda are needed.
- A transition to healthier diets as societies grow richer is needed to reduce both environmental and public health burdens.

RIO+20
United Nations Conference on Sustainable Development

THE FOOD SECURITY CHALLENGE

Food security is met when *"all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life"* (FAO, 2002)

Despite a marked increase in global food production over the past half century, around one billion people do not have enough to eat, and a further billion lack adequate nutrition. Continuing population growth over the next 50 years, coupled with increasing consumption by a wealthier population, is likely to raise global food demand still higher. Meeting this demand will be complicated by changes in environmental factors (collectively termed 'global environmental change', GEC), including climate, biodiversity, water availability, land use, tropospheric ozone and other pollutants, and sea-level rise. These changes are themselves caused partly by food system activities (e.g., excessive use of nitrogen fertilizers leading to eutrophication of freshwater and coastal systems, greenhouse gas emissions, and loss of 'wild-land' biodiversity leading to reduced ecosystem services such as pollination, biological control, etc.). The effects of these food system 'feedbacks' on the environment are exacerbated by GEC interacting with competition for resources from such changing land uses as production of feedstocks for biofuels.

While elements of GEC are allied closely to food production practices, food insecurity is not simply a problem of supply. The world currently produces sufficient food for all, but it is distributed unequally according to resources and wealth as well as changing patterns of supply and demand (see box). However, meeting demand (as expressed by markets) will not address the food needs of the poor; the food-insecure remain so largely because their incomes are too low or prices are too high. The likelihood of increasing food price volatility will continue to affect the poorest more than most. Furthermore, many vulnerable parts of the world remain in the grip of poor governance and conflict, which undermine physical, social and economic access to food.

GEC further compromises food security for those already prone to hunger because it affects all aspects of food security, i.e., the stability of food availability, access and use. Those whose livelihoods are bound closely with food production and who have low coping capacity are most vulnerable to the effects of GEC, which may include crop failure, attack from pests and diseases, and water shortage. In the short term, climate change will affect food security through more frequent and intense episodes of extreme weather, while longer-term effects include changing patterns of rainfall and temperature as well as soil degradation and biodiversity loss. At the same time, people across the globe may face rising food prices in the absence of a production response to increased demand, disease outbreaks and crises

PHOTO: ISTOCKPHOTO/GUENTER GUNI

of water management, together with broader impacts on local and national economies.

While there is scope to increase global food production, future approaches and technologies must be based on sustainable approaches to intensification, with the public goods provided by natural ecosystems (e.g., water and carbon storage) taken into account wherever possible. The complex interactions within and between the food system, natural resources and socioeconomic factors mean that close coordination among multiple sectors is vital. Stronger links must be forged between sectors relating to agriculture, fisheries, environment, trade, energy, transportation, marketing, health and consumer goods. In taking forward action agreed internationally, including through the G20 Action Plan, countries should adopt a sustainable and integrated approach to promoting improvements in productivity. This implies adopting a particular research focus on key crops, including those most relevant for vulnerable countries and populations.

A more joined-up approach should involve integrated analyses of food, climate, environment, population and socio-economic systems. The results will guide cross-sectoral decision making and the integrated responses needed to address food security and support sustainable and resilient livelihoods for future generations.

Changing patterns of supply and demand

In addition to continuing population growth, coupled with increasing consumption by a wealthier population in general, three issues are of particular importance in the food security debate:

Urbanization and increasing wealth
Over half of the world's population now lives in an urban environment. Where this is associated with increased affluence, it increases consumption expectations, thereby raising food demand per capita and local prices. However, the urban poor spend a large proportion of their income on food and are acutely sensitive to food price fluctuations. Urban development is also eating into prime agricultural land and, in many cities, nutrients are accumulating in waste instead of being returned to agricultural areas.

Globalization
Growing interconnectedness between food, energy and financial markets can lead to greater volatility in global food prices, sparked by both rising demand and competition for resources. Geographic interconnectedness of food markets *per se* has however increased food availability internationally and is likely to reduce global food price volatility. But its impact in any given country varies, depending on such market conditions and policy measures as import duties, export taxes and subsidies. In cases where such measures hinder the competitiveness of domestic producers, better market access and information systems are needed to help poor producers take advantage of new and emerging opportunities.

Changing consumption patterns
As people in the rapidly developing nations (e.g., China) become wealthier, they increase demand for processed food, meat, fish and dairy products. Such food often has a larger environmental 'footprint' than less processed food, and the larger volumes demanded by more affluent people cause even greater environmental impacts. The changing nature of demand offers both opportunities and threats to farmers, with those having better access to information, resources and markets set to benefit most. Multinational food retailers are becoming more powerful in negotiating prices with farmers and other suppliers. For the rural poor, the key challenge is to match supply and demand across the seasons, which calls for improvements in post-harvest handling, storage and distribution as well as better access to insurance and credit.

PHOTO: ISTOCKPHOTO/FOTOVOYAGER

ADOPTING A FOOD SYSTEMS APPROACH

"Adopting a food systems approach improves understanding of the interactions between food security and environmental or other stresses, thereby clarifying decision making regarding appropriate policy options."

While increased productivity will play an important role, the key to global food security lies in creating more equitable access to food and more resilient food systems. A food systems approach (see box) provides a framework to identify which food system activity is vulnerable to what stress(es), thereby showing where given adaptation and mitigation interventions would be most effective. The food systems of the future will need to match changing patterns of food supply and demand in ways that are both environmentally and socially sustainable. This includes making a dramatic increase in the efficiency with which resources are used (notably germplasm, nutrients, water and energy) as well as a reduction in waste throughout the food chain.

A resilient food system:

- can withstand economic and environmental shocks and stresses at different levels
- has redundancy built in (e.g., effective systems for storing adequate amounts of food and for their distribution in times of crisis)
- is supported by strong multilateral cooperation mechanisms equipped to coordinate collective responses to food shocks across national boundaries.

An equitable food system:

- ensures adequate amounts of nutritious food are accessible to all (social protection and other forms of cash transfers may be necessary to cope with price shocks)
- provides a level playing field for producers around the world (i.e., market access)
- is supported by research and development (R&D) and innovation systems that cater to the needs of the poor and the rich alike (i.e., provide new technologies with relevance to poor regions).

PHOTO: ISTOCKPHOTO/SIMON GURNEY

Food systems are becoming increasingly complex, with multiple interactions at several levels on a range of spatial, temporal and other scales. They are dependent on and influence biogeochemical and socioeconomic processes. Their high dependence on energy and water requires ever-closer coordination between practice and policy for these sectors, as well as with sectors responsible for the environment, trade and transportation, marketing and consumption. This gives rise to substantial institutional complexity, with multiple actors operating within different institutional frameworks. The food systems of the future will therefore need to be based on innovative interdisciplinary research, enhanced science–policy dialogue, and greater institutional and societal flexibility. Private sector research now dominates technological developments for several key food and feed crops so private and non-governmental organizations must be included in future decision making.

What is a food systems approach?

Food systems involve:

- a set of *activities* related to producing, processing, distributing, marketing, preparing and consuming food; and
- the *outcomes* of these activities contributing to food security (food availability, food access and food utilization, all stable over time) and to other socioeconomic (e.g., wealth) and environmental (e.g., greenhouse gas emissions) issues.

A food systems approach *systematically* connects the *activities* of food producers, processors, distributors, retailers and consumers involved in food systems with food security and other *outcomes*. This helps in a number of ways:

1. Providing a checklist to help ensure the necessary issues are included in dialogues aimed at enhancing food security (especially in the context of other goals) and identifying the range of actors and other interested parties who should be involved.
2. Assessing the impacts of GEC on food systems by focusing on multiple vulnerabilities in the context of socioeconomic stresses.
3. Determining the main limiting factors that lead to food insecurity, thereby identifying intervention points for enhancing food security.

By *systematically* connecting the food system *activities* with the food security and other *outcomes*, the approach helps unravel the complexity inherent in food systems: it frames the interactions as dynamic and interdependent processes that are embedded in social, political, economic, historical and environmental contexts. Adopting a food systems approach improves understanding of the interactions between food security and environmental or other stresses, thereby clarifying decision making regarding appropriate policy options.

FOOD SYSTEM ACTIVITIES

Producing food: natural resources, inputs, markets . . .

Processing and packaging food: raw materials, standards, storage requirements . . .

Distributing and retailing food: transport, marketing, advertising . . .

Consuming food: acquisition, preparation, customs . . .

FOOD SYSTEM OUTCOMES CONTRIBUTING TO:

Social Welfare

- Income
- Employment
- Wealth
- Social capital
- Political capital
- Human capital

Food Security, i.e., stability over time for:

Environmental Welfare

- Ecosystem stocks and flows
- Ecosystem services
- Access to natural capital

Food system activities and outcomes (adapted from Ingram et al., 2010)

MEETING THE CHALLENGE

"The challenges of food security, natural resource use and GEC call for countries to renew their efforts to work together in the management of global public goods"

PHOTO: ISTOCKPHOTO/FRANK VAN DEN BERG

Since human development and food security are closely interlinked, ensuring a sustainable future means making substantial changes in the way food is produced, processed, distributed and consumed. This will require scientific, technological and policy innovations that must be endorsed strongly by the political sector, implemented by the public and private sectors, and embraced by society as a whole.

The issue of sustainable food production must be rooted firmly at the centre of all efforts to improve food security and advance human development. Ensuring the poorest and most vulnerable have sufficient access to food means making fundamental changes in the way global economies function (including 'greening' the economy, see box), coupled with social changes in terms of consumption patterns.
Political action is greatly enhanced by the setting of targets, but the multi-dimensional aspects of food security mean it is difficult to measure, particularly globally. Some indices are available in respect of food availability, access and utilization (e.g., agricultural productivity, food prices, nutrition scales; and proxies such as childhood stunting, see figure on next page), but key indicators that signal future trends in food security overall are difficult to identify. While a composite index that combines some elements of food availability, access and utilization with measures of economic development and political stability could be useful, it needs to be recognized that trade-offs exist between these elements.

The challenges of food security, natural resource use and GEC call for countries to renew their efforts to work together in the management of global public goods. This includes greater cross-system coherence and integrated planning across institutional frameworks. New institutional arrangements are needed to promote cooperation between public and private investors in food systems and to recognize the rapidly expanding role of non-state actors. Finally, institutions must adopt a more flexible approach to encourage more equitable and sustainable consumer choice. This will require enhanced food system governance, since poor governance and conflict are among the key drivers of food insecurity.

Greening the economy

The route to more sustainable food systems and economies takes many different paths and includes more sustainable use of energy and patterns of consumption, as well as sustainable intensification of food production. Agroecological approaches based on a range of technologies and levels of production, improved food systems understanding and enhanced management will play important roles. Poverty reduction and greening of the economy must be regarded as complementary not competing goals, since sustainable food systems protect the assets on which the livelihoods of the poor depend. Enabling policies and institutions are therefore needed to support the creation of real opportunities for economic development among poor communities.

Stunting prevalence
% under 5 (2000–2008)

- >=20
- 20–30
- 30–40
- 40–50
- >50
- no data

Countries experiencing chronic food insecurity, as indicated by a high prevalence of stunting in children aged less than 5 years. This indicator can be used as a proxy for coping capacity, since an inability to tackle chronic food insecurity indicates a number of institutional, economic and political issues in addition to those associated with food production. (Adapted from Ericksen et al., 2011.)

References and further reading

Ericksen P.J. et al., 2011. *Mapping Hotspots of Climate Change and Food Insecurity in the Global Tropics*. Climate Change, Agriculture and Food Security (CCAFS) Report no. 5. http://ccafs.cgiar.org/resources/climate_hotspots.

Evans, L.T. 1998. *Feeding the Ten Billion: Plants and Population Growth*. Cambridge University Press: Cambridge, UK.

FAO, 2002. *The State of Food Insecurity in the World (SOFI) 2001*. Food and Agriculture Organization of the United Nations: Rome, Italy.

FAO, 2010. *The State of Food Insecurity in the World (SOFI): Addressing food insecurity in protracted crises*. Food and Agriculture Organization of the United Nations: Rome, Italy.

FAO, 2010. *Climate Smart Agriculture, Policies, Practices and Financing for Food Security, Adaptation and Mitigation*. Food and Agriculture Organization of the United Nations: Rome, Italy.

G20 Agriculture Ministers, 2011. Ministerial Declaration: Action plan on food price volatility and agriculture. Meeting of G20 Agriculture Ministers, Paris, 22 and 23 June 2011.

Ingram, J.S.I., Ericksen, P.J. and Liverman, D.M. (Eds.) 2010. *Food Security and Global Environmental Change*. Earthscan: London, UK.

UK Government Foresight, 2011. *The Future of Food and Farming*. Final Project Report. The Government Office for Science: London, UK.

Compiled by:

John Ingram (Natural Environment Research Council, UK: Convenor), Pramod Aggarwal (Climate Change, Agriculture and Food Security), Polly Ericksen (International Livestock Research Programme), Peter Gregory (East Malling Research, UK), Leo Horn-Phathanothai (United Nations Development Programme), Alison Misselhorn (University of KwaZulu-Natal, South Africa), Keith Wiebe (Food and Agriculture Organization of the United Nations).

Editing, design and layout: Green Ink, UK (www.greenink.co.uk)