Policies for a transition towards more sustainable and climate friendly food systems

I'm a pessimist because of intelligence,
but an optimist because of will.
(Antonio Gramsci)

A brief history of our food system

Since Word War II, our food system has been characterised by huge investments in irrigation[1], intense efforts towards plant and animal genetic improvement[2], promotion of agrochemicals[3] and mechanical help for food production, specialisation of production leading to rapid growth of food trade flows[4] and a boom in food processing. These changes have been supported by huge support from the public sector and considerable investment by private operators, including farmers.

As a result, productivity and production have increased tremendously along with the non renewable energy content of our food, while rural areas and particularly farmers continue to be subject to poverty and food insecurity that affects hundreds of millions of people[5]. Massive rural-urban migrations have been one of the main scene-changing phenomena observed worldwide. Simultaneously, more than 1,5 billion people are overweight and 600 million obese, and their numbers are rapidly increasing,

There are increasing concerns about sustainability of our food system, given indisputable signs of degradation of the natural resource base, rapid growth of food consumption, climate change and food related health hasards.

This situation calls for a serious reflection on the challenges to be met[6] and on the policies required to facilitate a rapid transition towards a more sustainable food system.

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[1] Maetz, M., Water and hunger, 2013.

[2] Maetz, M., Genetic resources: acceleration of privatisation of living organisms is a threat to food security and biodiversity, 2013.

[3] 112 million tons of nitrogen were used in agriculture in 2011, some 30% more than in 2002, and 2.7 million tons of highly toxic phytosanitary products (pesticides, herbicides, fungicides, etc.) were sprayed on crops, an increase of 250% since 1990. Maetz, M., Food, Environment and Health, 2017.

[4] From less than $100 billion in the 1960s to more than $1,000 billion in 2010, Maetz, M., International trade in agricultural commodities, 2014.

[5] Maetz, M., Facts and figures on world hunger, 2017.

[6] Maetz, M., What are the challenges to be met in order to secure a sustainable future for our food system? 2017.

This paper proposes a way to approach the issue and discusses with some more depth the specific policy package available to make food systems more climate-friendly.

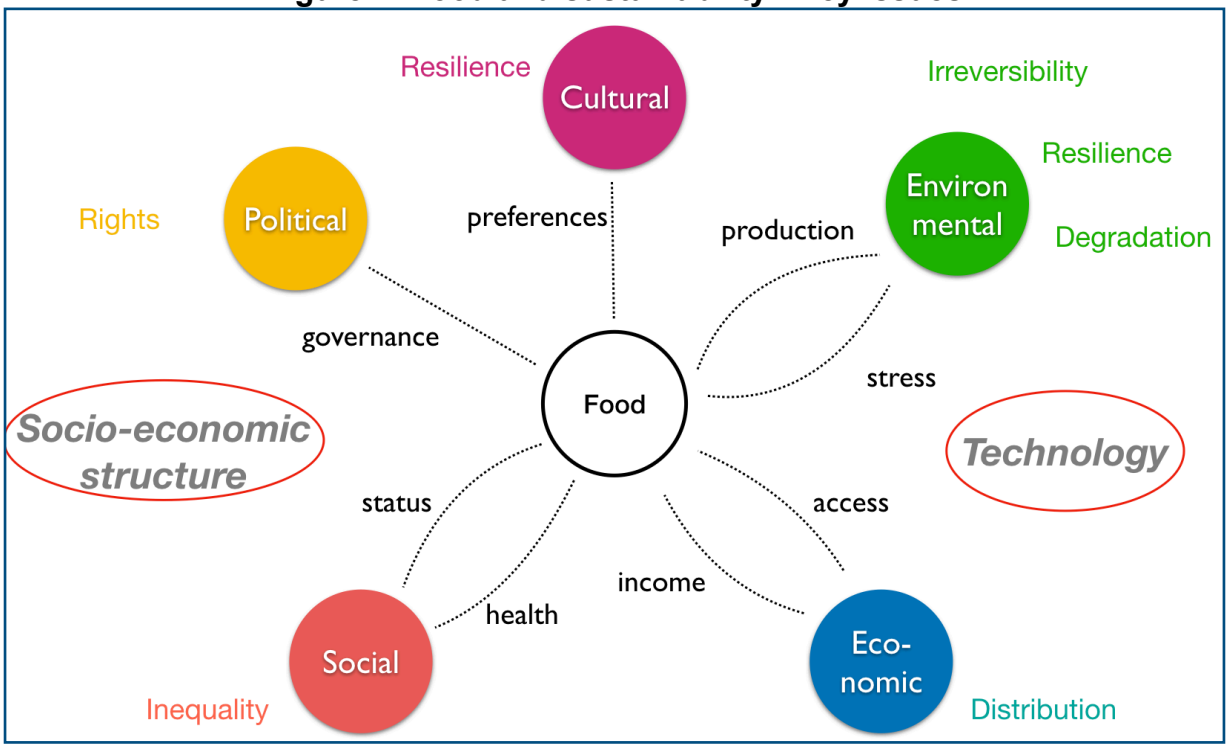
What would a sustainable food system look like?

The concept of sustainable development was coined more than twenty-five years ago by the Brundtland Commission (*Our common future*) in a report that served as a basis for the 1992 Earth Summit in Rio de Janeiro, Brazil. Sustainable development was to "*be fulfilled so as to equitably meet developmental and environmental needs of present and future generations*"[7]. During the Earth Summit, these needs were considered as having social, economic, ecological, cultural and spiritual dimensions. With time, the first three of these dimensions were those that attracted most attention. For many, over the years, sustainability became equivalent to environmental sustainability, a bias that increased as more importance was being given to climate.

In this paper, we will consider a five dimensional concept that covers *economic, social, environmental, political and cultural* (including spiritual) domains.

The key issues related to these domains are represented in **Figure 1.**

Figure 1: Food and sustainability - Key issues



They can be summarised by: (i) stress generated on our environment by the food system in order to produce our food; (ii) income generated from food production and the capacity of consumers to have access to food; (iii) social status in its role in food consumption and food consumption with its impact on health; (iv) the mode of governance of the food system and its implications; and (v) food preferences and their evolution in connection with culture and cultural change. These issues are raised in a background where the nature of

[7] Rio Declaration on Environment and Development, Principle 3, 3-14 June 1992. See also a series of three articles on sustainability and inter-generational equity on hungerexplained.org.

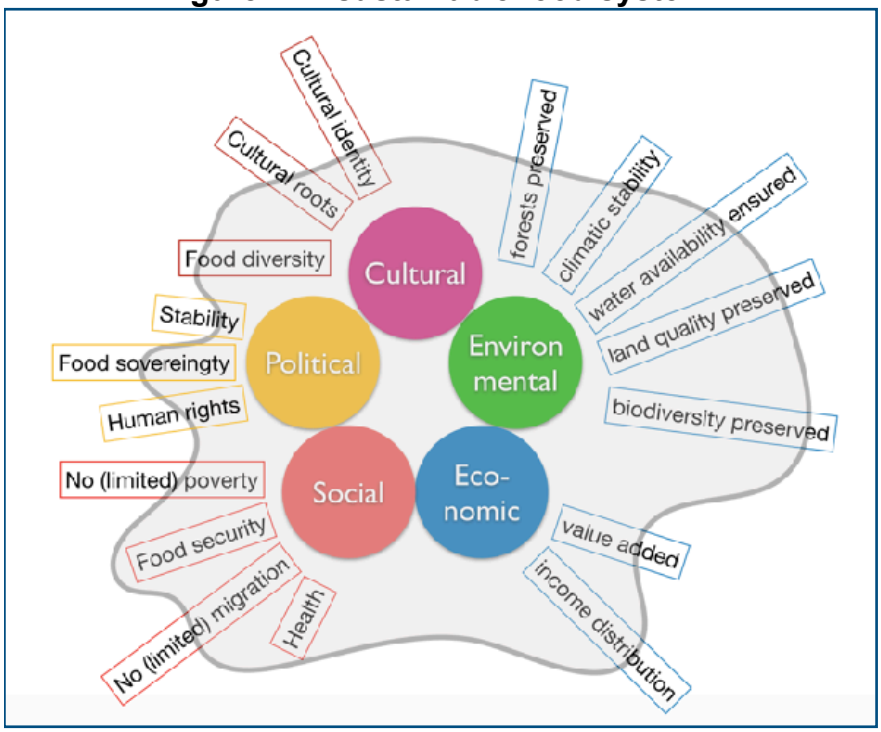
the technology that underpins our food system and our socio-economic structure play a crucial role.

Considering these issues, what would a sustainable food system be like?

It would be a system (see **Figure 2**):

- From an economic point of view:
  - That contributes to the wealth of the economy by creating value added;
  - In which value added would be distributed equitably among various agents operating in the system along its value chains to allow all of them a decent living.
- From a social point of view:
  - That contributes to eradication of poverty;
  - That ensures food security for all;
  - That does not force a sizable share of producers out of the food system (e.g. through poverty or land grabbing);
  - That protects health of those working in the food system as well as that of food consumers.
- From an environmental point of view:
  - That contributes to stabilisation of the climate (e.g. by reducing GHG[8] emissions and increasing carbon sequestration);
  - That ensures natural resources availability and quality (land, water, forests biodiversity).
- From a cultural point of view:
  - That protects cultural identity and roots;
  - That promotes food diversity.

Figure 2: A sustainable food system*



* **Note**: the amoeba-like grey area on the diagram suggests that individual dimensions cannot be dealt with separately from the whole system.

[8] GHG: Greenhouse gas.

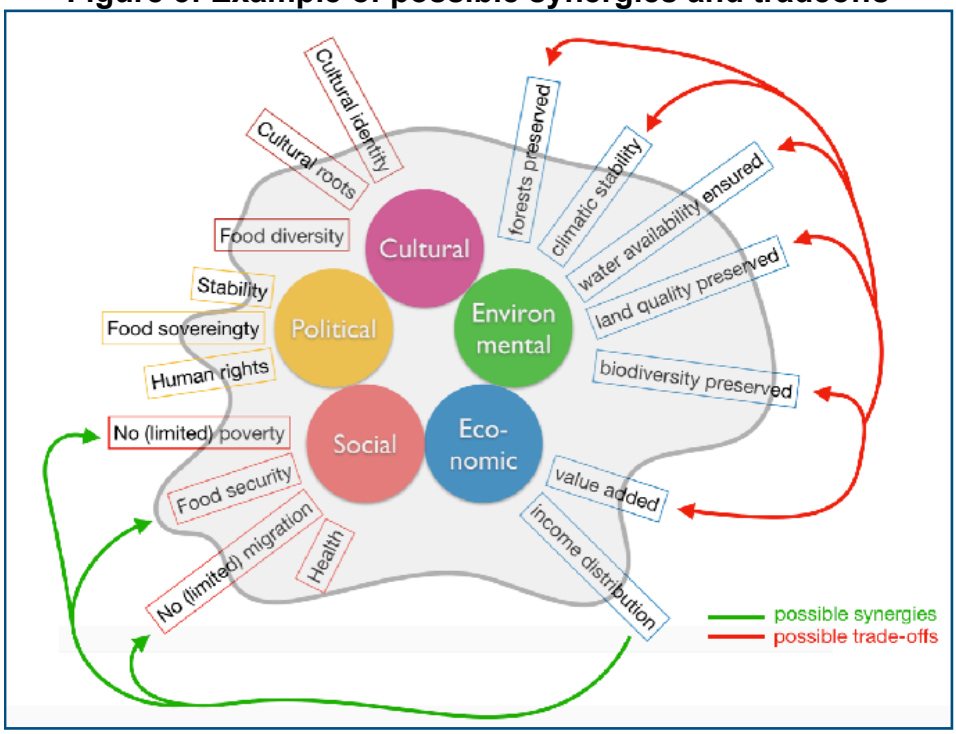
- From a political point of view:
  - That preserves political stability and peace ;
  - That ensures food sovereignty;
  - That protects human rights, including the right to food.

Attempting to moved towards a more sustainable food system means achieving progressively these characteristics which are *objectives*.

The complexity of the problem requires two critical words of caution:

1. Quite obviously, there are strong causal links, synergies or trade-offs among these various dimensions and it is not possible to deal with each of these dimensions and their individual characteristics in isolation. Rather, it will be desirable to adopt a systemic approach, particularly when figuring out what kind of policy environment is likely to be conducive for achieving a sustainable food system (**Figure 3**);
2. The policy mix appropriate to move towards a sustainable food system will depend on the particular context within which it is applied (e.g. current performance of the food sector regarding the five dimensions, key constraints and opportunities, political context and power balance, overall policy orientation, rich/poor country; food exporting/ importing country; relative weight of the food system in the economy; level of development of value chains, etc.)[9]. So there is no "ideal" policy mix to be recommended here that would be applicable to all situations (one-size-fits-all kind of solution). In a rich economy, most perceived issues will likely include health, income distribution within value chains, biodiversity, climatic stability and a few others. In poor economies, most perceived issues will likely include poverty and food insecurity, value added, climatic stability, income distribution, food sovereignty and many others.

Figure 3: Example of possible synergies and tradeoffs



[9] M. Maetz and J. Balié, Influencing policy processes – Lessons from experience, FAO, 2008.

What measures for moving towards more sustainability?

In a mixed economy where the private sector, the public sector and civil society coexist within a system where market processes and public policies set the stage - as is the case in most countries in the world nowadays -, there are three main types of measures that can be used in order to influence people's behaviour and orient it in such a way as to make the food system more sustainable:

- Measures that modify *incentives/disincentives* to adopt certain behaviours. These incentives may comprise financial (taxes or subsidies) or social measures (recognition or discredit);
- Measures that modify *rules and norms* to be followed by all economic agents;
- Measures creating *opportunities* for economic agents to seize: new technologies, new institutions, new infrastructure, new services, new information and, more generally, improved public goods.

Let's illustrate this by a few examples showing how a particular policy can affect the sustainability of a food system.

Incentives/disincentives : Nitrogen fertiliser subsidy.

Historically, considerable efforts have been made - and continue to be made, particularly in poor countries - to provide financial incentives for adopting certain technologies (e.g. subsidies on fertiliser, on mechanisation of agriculture, on investment in agro-processing). In the short run, this type of policy impacts positively on production and value added[10] and on deforestation (as productivity of land increases), on labour productivity (and conditionally on income), on the quality of food storage conditions and, for the consumer, on the share of time allocated to food preparation.

In the specific case of a nitrogen fertiliser subsidy, the downside effect is that it has tends to encourage overuse of fertiliser, thus contributing to increased emissions of GHG emissions to the detriment of climate stability[11] and pollution of soil and water[12]. Moreover, in the case of a poor country, the subsidy benefits mostly the richest producers and thus is not in favour of a better income distribution, nor does it reduce food insecurity or poverty, the poorest and most vulnerable producers not being in a position to benefit, as a large proportion of them are not even able to mobilise the cash required to pay for the subsidised of fertiliser. It is also detrimental to agricultural biodiversity and food diversity, as only a limited number of species and varieties are sufficiently responsive to fertiliser to make it an attractive option.

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[10] But data on cereal production in France for example, suggest that with time, this impact is lost, mainly because of degradation of soil quality and level of biological activity. In Asia in paddy farming, nitrogen fertiliser is known to contribute, with time, to soil acidification.

[11] Fertiliser degradation is estimated to amount to 2% of total GHG emissions, and processing can be estimated to be responsible of around 4 to 6% of total GHG emissions - M. Maetz, Climate is changing - Food and Agriculture must too, 2016.

[12] M. Maetz, Food, Environment and Health, 2017.

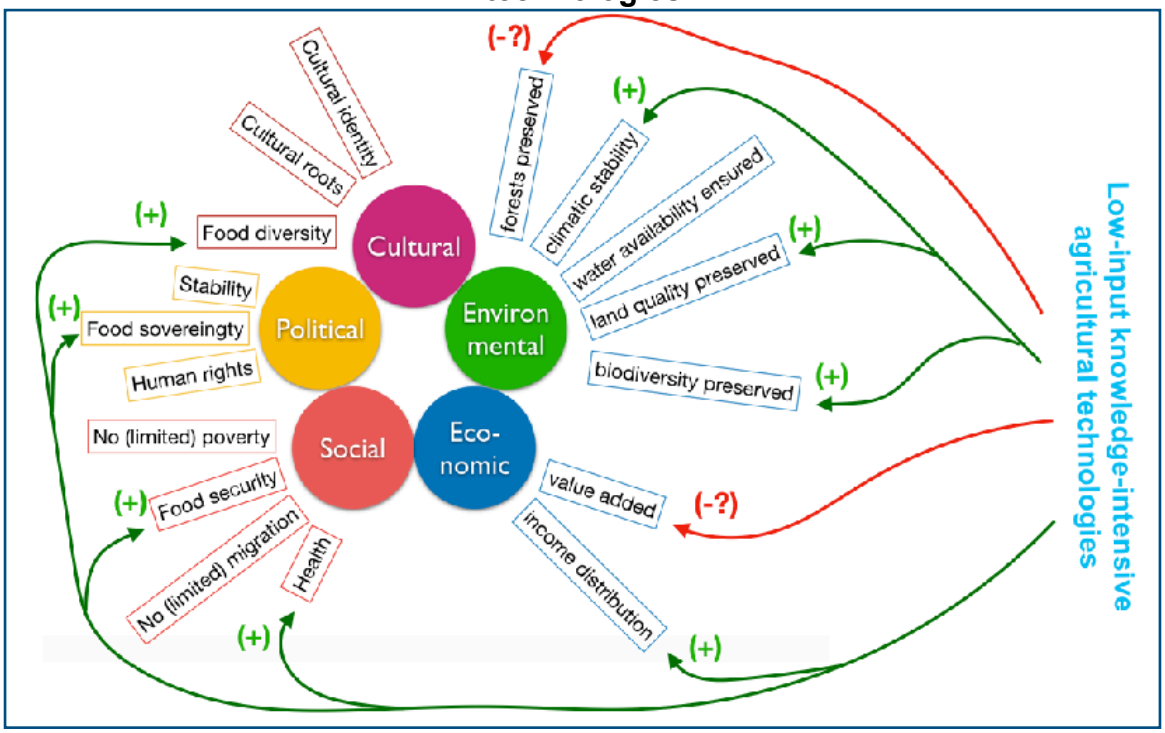
Regulatory measures: Health-related food labelling: colour code.

There is an increased awareness that the composition of food impacts on health: content of food in terms of sugar, fat and salt is the most blamed for food-induced diabetes, cardiovascular diseases and cancer. Some countries envisage to introduce easily readable colour codes (e.g. red, yellow, green in the UK, five colours in France; similar systems are in development in Kenya, Ghana and Nigeria) to inform consumers on health hazards associated to consumption of various food items. With such an easily understandable code, it is expected that the main positive impact of this measure will be on health.

Other possible positive impacts could include a more diversified diet and a better distribution of income within the food chain. If colour-coding is compulsory, agro-processors could possibly take a reduced part of value added as they may lose part of their business or have higher production costs, to the likely benefit of other agents, including primary producers and consumers. If colour-coding is optional, those businesses who adopt it and who are in a position of demonstrating quality could gain (more business, more profit), while those who either do not adopt it or produce products associated with health hazard would probably lose business or be obliged to reduce prices (and profit). In this case too, primary producers and consumers would likely benefit, although probably at a different time horizon (short term for producers, medium or longer term for consumers).

The downside of colour coding is that it may increase costs and reduce value added in the food sector. It could also imply an increase of the price of food which, if no compensatory measure is implemented, could result in additional food insecurity.

Figure 4: Possible impacts of low-input knowledge-intensive agricultural technologies



Creating opportunities: research and extension in low-input knowledge-intensive agricultural technologies **(Figure 4)**

Replacing energy intensive production technologies that are aggressive for the environment and not accessible to poor farmers requires developing and disseminating low-input knowledge-intensive agricultural technologies (e.g. agroforestry, sustainable rice intensification (SRI), push-pull and integrated pest management (IPM)). These technologies will impact positively on the environment by preserving or improving land and water quality, reducing GHG emissions and promoting agricultural biodiversity. By reducing the use of commercial inputs, they increase value added going to the primary producer, reduce health hazards for both the producers and consumers, contribute to greater food diversity (crop associations) and food sovereignty (e.g. through reduced dependence on commercial inputs). The combined result of all these positive impacts is improved food security for poor farmers in the South.

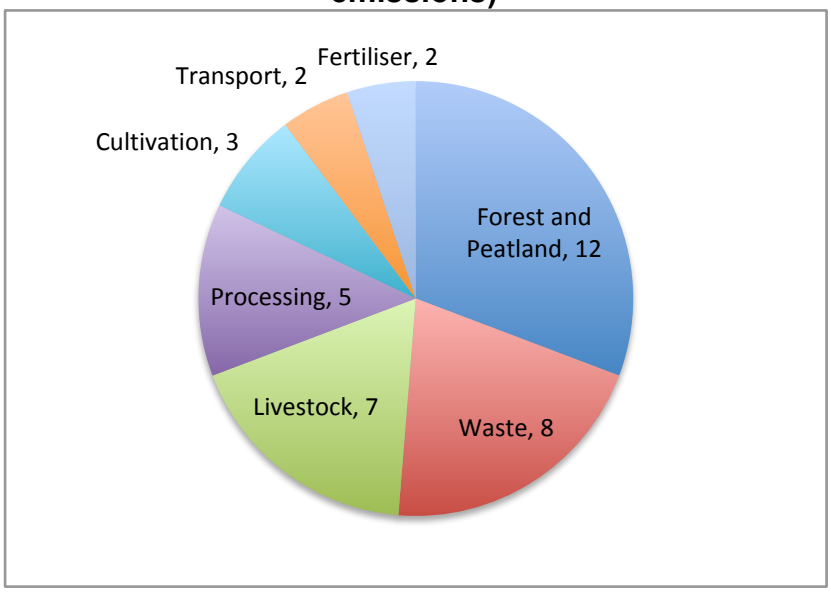
The downside of these technologies could be reduced overall value added in the food sector (mostly in the short term) and, possibly, increased pressure on forest resources as long as overall food consumption does not change (e.g. in the direction of less wastage and less consumption of animal products).

Example of a policy package

In practices, policy instruments are rarely used in isolation. They are generally grouped in policy packages that address a set of issues and aim to achieve a set of objectives.

Let's present here the menu of options for a policy package that would attempt to mitigate GHG emissions from our food system, a key objective that should be part of any strategy for moving towards a more sustainable and climate-friendly food system.

Figure 5: Sources of GHG emissions from the food system (in % of total GHG emissions)



Source: own computation based on data from FAO, WTO, World Bank and IMF[13].

[13] M. Maetz, Food, Environment and Health, 2017.

Designing a policy package to mitigate GHG emissions related to food requires that first a diagnosis is made on what the main sources of emissions in the food system are. The nature of the issue - global - determines the nature of the policy package required that cannot just be applied at national level, even though GHG emissions can be linked to the location from which they are emitted and to specific local problems. But they (local emissions and policies) also have global consequences.

To tackle these emissions, a wide range of policy measures could be used.

Incentives/disincentives

- Removal subsidies on fossil fuels, on energy-consuming machinery, on electricity (as long as it is mostly generated by burning fossil fuels), on chemical ingredients[14];
- Taxing GHG emissions;
- Support through subsidies of climate-friendly practices that, for the time being, are at a disadvantage as they have to compete with practices that generate negative externalities[15] (e.g. in Viet Nam[16]);
- Remove all measures that reduce food prices and compensate price increase with enhanced food assistance[17];
- Tax exemption for retail shops who make food donations to associations and food banks with the view to reduce food waste;
- Grant incentives for recycling of food waste;
- Higher subsidies to local communities who accept to preserve their forests and peatland.

Regulatory measures

- Ban harmful practices in food value chains that generate a large amount of GHGs.
- Remove regulatory and institutional hurdles to the development and operation of local and sustainable agriculture and Community Supported Agriculture (e.g. protection of agricultural land near cities, ease access to finance, run training programmes on sustainable technologies, relax seed policy, etc.)[18];
- Re-visit food handling regulations in retail shops;
- Develop and apply stricter environmental norms for large-scale industrial livestock production;

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[14] In their 2012 paper on Reforming Energy Subsidies, the International Monetary Fund (IMF) estimated at $1.9 trillion (2.7% of world GDP, almost equivalent to the GDP of Italy in 2011), the amount of energy subsidies paid in the world.

[15] An externality corresponds to a situation where the act of producing or consuming by an economic agent has a positive or negative impact on one or several other agents not directly part of the act, and where these affected agents do not have to pay for all the benefits that have accrued to them or are not fully compensated for the harm they have suffered. In practical terms, this often means that the costs of such externalities end up being met by future generations.

[16] For example, in Viet Nam, compensation is provided to producers who adopt climate friendly practices in rice (reduced use of water and agrochemicals).

[17] A. MacMillan, Hasn't the time come for some brave new thinking on food management?, 2014.

[18] Maetz, M., Are existing food and agricultural policies supportive to local sustainable food systems? 2015.

- Ensure effective protection of forests and peatland including ban on oil palm expansion on peatland.

Creating opportunities

- Develop research activities into technological innovations that do not generate negative externalities (including GHG emissions) and do not require investment in infrastructure for which the construction is energy intensive. Priority should be given to knowledge-intensive (rather than capital intensive) technologies so as to facilitate access by poor producers and reduce costs. These innovations should contribute to increase productivity of agricultural land, reduce pressure on forests and boost carbon storage in sols. This will require more public funding of research as resulting technologies will not be easy to embody in marketable goods and thus will not be attractive for the private sector. Research will to a large extent need to be conducted so as to develop technological packages that will be adapted to the diversity of local conditions;
- Using opportunities arising from associating crops;
- Reviving cultivation of traditional crops and varieties (e.g. "orphan" drought-resistant crops such as millet, sorghum or fonio in Africa, barley in temperate countries)[19];
- Develop less energy intensive food processing and storage technologies and techniques for recycling waste with a view to producing energy that will be used for food processing and storage;
- Invent improved forest management techniques for increasing biomass storage and preserving biodiversity;
- Invest in research in agroforestry so as to use its benefits in terms of microclimate management, soil fertility improvement and increase of biomass for carbon storage;
- Implement programs to disseminate and help the adoption of new technologies resulting from boosted research efforts.

In this case as in others, the appropriate mix of policies to be included in the policy package will depend on specific conditions of the location where it is being implemented.

Why is the transition to a more sustainable food system so difficult?

There is a growing consensus that our food system is not sustainable. The points below illustrate aspects this consensus encompasses:

- The dual relation between the food system and climate change and, more generally, natural resources (e.g. land, water, forest and biodiversity) is illustrated by convincing evidence showing that food is a key factor and a major "victim" of climate change and natural resources degradation;
- The undervaluation of food and its relatively low prices - despite the increase observed during the last decade - are linked to unaccounted negative externalities of our food system and go with poor levels of remuneration of a large proportion of workers in the food system[20];

[19] See in this context the interesting work done by FAO in the framework of GIAHS (Globally important Agricultural Heritage Systems).

[20] See for example: M. Maetz, US Food and Agriculture: present and (perhaps) future situation, 2017.

- Concentration and power balance in the food system result in large proportions of highly indebted farmers, alarmingly high suicide rate of producers in both poor and rich countries, while rural-urban drift is a major characteristic of past and present times with considerable social hardship and serious cultural implications;
- Food safety has become a major concern of consumers, following a series of cases of contamination;
- Accrued attention to food sovereignty and the right to food illustrates the political weight of the food issue and constitues a reaction against a high concentration of power within the food system;
- Concerns about cultural implications of changes in food consumption patterns result from a progressive worldwide homogenisation of diets.

Why then are measures to facilitate a transition towards a more sustainable food system not taken with urgency?

Figure 5: An ominous sky…

The time dimension

Time has a special importance in the sustainability debate. It translates in different ways:

1. Presentism: the time of sustainability and the time of politics are so different that, unless the impact of unsustainability can be felt today, there is very little political credit to be gained by trying to address the issue. Individually, we tend to prefer the immediate to the future. In a democracy, we believe that the best judges of our laws are those whom they affect and, as the share of older generations increases in population, the propension to give priority to immediate issues increases. Thus our laws tend to neglect future risks and the attention of our political personnel is mainly on showing immediate results (in time for next elections). This raises the question of how interests of future generations can be represented today, a tricky problem that some solve by advocating that what needs to be done is to ensure that future

generations will at least have as much control over future choices as we currently have[21].

2. Despite the consensus, unsustainability still appears more a matter of the future than of the present. Signs of unsustainability are yet too weak to justify making efforts (and spendings) to achieve transition towards more sustainability.
3. The further we look to the future, the weaker and more indeterminate our connection with future generations.
4. Dominant economic thinking (e.g. the use of the analysis of rates of return to decide on investments to be made investment) gives greater weight to costs and benefit today than in the future (discounting rate), thus introducing a bias in decision-making that systematically underestimates future costs and benefits;
5. A bias against the future. When comparing conventional agriculture and ecological or organic agriculture, it is common to use current yields in those types of agriculture in order to conclude that only conventional agriculture will be able to feed the world. This thinking introduces a bias as it assumes that current yields in conventional agriculture will last in the future (while there are already good indications that yields in conventional agriculture are likely to decrease unless major adjustments and investments are made[22]) and it overlooks the fact that it is likely that with more research, yields in ecological and organic farming are likely to increase in the future.

The unfavourable political and economic context

Over time, agriculture has become highly integrated into the overall economy. Its development since World War II is closely linked to the development of the chemical industry, civil engineering and public works, international transport and trade, food processing and retail. This has generated economic giants that have vested interests in keeping on the same path the industrial development of our food system[23] that rest on a "chemistry and concrete" agriculture, creates huge imbalances of power that are detrimental to the mass of food producers as well as to consumers, and that relies on huge governance shortcomings where national governments are no more able to take relevant decisions to solve the most important problems that are, at least in part, of a global nature (climate change, impoverishment of agricultural biodiversity, technological change).

The weakness of States in the face of industrial, commercial or financial giants does not give them the capability to impose changes required to meet the challenge of food sustainability, all the more as governments tend to seek the immediate national interest and often adopt a free rider behaviour which further weakens them.

Regarding global governance, the recent reinforcement of the Committee on World Food Security (CFS) is a step in the right direction, but yet insufficient to ensure properly coordinated action particularly with the emergence of various bodies and alliances that are

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[21] Thompson, Dennis F., Representing future generations: political presentism and democratic trusteeship, Critical Review of International and Political Philosophy 13(1): 17-37, 2010.

[22] Fresco, L., Local and organic is a romantic myth – the future of sustainable agriculture is all about smart technology and scaling up, Aeon, 2015.

[23] Mooney, P. (Coordinator), Too big to feed - Exploring the impacts of mega-mergers, consolidation and concentration of power in the agri-food sector, IPES-Food. 2017.

established by States and private entities outside of existing world bodies[24]. Original as it gives equal status to various stakeholders (States, civil society organisations including farmer organisations, private sector and international organisations) and supported by a dedicated High Level Panel of Experts, the focus of the CFS is on public policies, but it however has no decision-making authority and governments are free to implement or not its recommendations (i.e. The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security).This probably allows it to be innovative in its thinking but limits its actual impact on the ground. It remains vulnerable because of under-funding, making it exposed to donor influence.[25]

A need for more commitment and civic behaviour

Success of any policy package will depend on response by the people, individually as well as collectively within their associations, local governments and/or private companies. Consumer choices will play an essential role as they influence behaviour of political leaders and private firms alike who will do what is required to improve their image to obtain votes and sell their goods[26]. Consuming local fresh food, rather than commoditized and processed food "from nowhere", refusing to eat off-season food, reducing excessive consumption of animal products and purchasing fair trade products are steps into the right direction[27]. These changes are starting to trigger adaptative modification within the food system where organic farming is growing rapidly.[28]

Conclusion: what you need to remember

Regarding policies for a transition towards more sustainable food systems, the main ideas to remember can be summarised in four points:

- The current situation of our food system is a result from **history**. There is nothing 'natural' or 'unavoidable' in its evolution towards unsustainability. Rather it is the result of a series of human decisions and reflect a power balance in our societies;
- To move towards more sustainability, there is a need to define concretely the **objectives** that should be reached in the various dimensions of sustainability. The relative importance - and priority - for achieving each of these objectives depends on the specific situation prevailing in a particular area, country or region;
- There is a large number of **policy measures** that can help to move towards more sustainable food systems. Those to be used will depend on specific situations (no one-size-fits-all solution), priorities and implementation capabilities;

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[24] The New Alliance for Food Security and Nutrition: a coup for corporate capital? by N. McKeon, 2014, presentation on hungerexplained.org.

[25] McKeon, N., Global Food Governance - Between corporate control and shaky democracy, Global Governance Spotlight, sef: (Development and Peace Foundation), Bonn 2018.

[26] Maetz, M., Le système agricole et alimentaire international à la recherche d'une bonne image, 2013 (in French only).

[27] Maetz, M., Our food system: some reasons for hope…, 2017.

[28] Maetz, M., Is organic agriculture, under pressure from consumers, turning into the central element of the transition from a conventional "chemical" agriculture towards a more sustainable agriculture? 2018.

- The main **obstacles** preventing us from moving rapidly towards more sustainability, besides lack of knowledge and understanding of natural processes, are our perception of time and a currently rather unfavourable political context.

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(April 2018)