

Biodiversity, Ethno-diversity and Food Cultures: Towards More Sustainable Food Systems and Diet



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During the 1990s and the early 2000s, the issue of world hunger faded into the background. Not that the problem had disappeared, but other matters (such as the global obesity epidemic or the political and health issues surrounding the use of GMOs) took centre stage in the media. In June 1998, the sharp rise in the prices of food raw materials, particularly cereals, triggered the so-called hunger riots in many countries. This gave new impetus to an old question: How can we feed a growing human population? For several decades, the stakes seemed to be more on the side of quality than quantity, at least in the Western world. So much so that agricultural Europe set up production quotas for certain products and reintroduced the practice of fallow land.

A growing environmental awareness arose during the same period. It led to biodiversity being seen as a common heritage of humanity, worthy of protection, and subsequently to reconsider the consequences of decisions made at local levels in a self-regulated world. With globalisation, the idea that certain human cultures were disappearing gave way to the concept of ethno-diversity, echoing that of biodiversity, both of which were regarded as a heritage for all humanity. Connected to the question of sustainability, the two concepts allowed for the reorganisation of the

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Malthusian model and the transformation of the status of diversity of food cultures into resources, to face the challenge of hunger.

1 From Politicization of Hunger to Sustainability

The adequacy of food production to the needs of the world's population is seemingly an issue that is easy to model. Moreover, historically it is the epistemological starting point for modern social sciences: economics, demography and to some extent sociology and anthropology. In 1798, in his "An Essay on the Principle of Population", Thomas Malthus theorized that the world's population grows in geometric progression, while the capacity to produce food evolves according to an arithmetic progression, thus drawing a catastrophic future. He predicted that if care were not taken to reduce population growth, the earth would become the scene of deadly struggles because of hunger. As agronomic and demographic knowledge evolved, the theme of world hunger became clearer. In 1938, Anton Zischka (1938) wrote a book entitled *Brot für 2 Milliarden Menschen* (Bread for Two Billion Men). The contemporary reader will note both the demographic scale of two billion as a warning horizon and the ethnocentrism that posits bread as universal food. A few years later, Maximilien Sorre (1943) developed a theoretical reflection proposing a way of overcoming the two competing paradigms that was exploring the relationship between man and nature in geography: the determinism of "anthropo-geography" that gave priority to the environment, and the "possibilism" of Paul Vidal de La Blache, for whom human action is almost limitless. Sorre promoted a vision focusing on the interactions between man and his environment, which would later give birth to modern ecological anthropology (Steward 1955). In his "Geopolitics of Hunger", Josué de Castro (1952) took the question of hunger out of the charity order to place it in the political order. According to him, the instruments used to fight against hunger were to be found in social and political organization.

The second half of the twentieth century was marked by ecological awareness. In 1974, René Dumont, a leading figure of Third-Worldism, ran for the French presidential election. During the television campaign, he appeared on screen with a glass of water in his hand and made a gloomy prognosis: "If we do nothing, we will not be able to drink any more water in twenty years' time". The French magazine *Le Nouvel Observateur* launched an ecological supplement called *Le Sauvage*, with "Vegetable activists" on the front page of its first issue, and an article announcing without detour that "humanity must prepare to become vegetarian". This was followed by a demonstration highlighting (albeit a little quickly) "that producing 1 kg of animal protein requires as many resources as producing 7 kg of vegetable protein". As the population was growing faster than production capacity, and the cultivated areas would soon reach its limits, there would be no choice but to change eating habits, including reducing, if not abandoning, animal products, in order to cope with the coming crisis.

The 1980s marked a turning point in this debate. In France and other developed countries, the poor were hungry. In 1956, the founder of the Emmaüs movement, Abbé Pierre had taken a strong stance on the poverty issue. However, it was not the lack of food that he highlighted, but the lack of a roof and protection against the cold. But this time the scandal arose from the contrast between the overabundance of agricultural surpluses, the mountains of tomatoes or cauliflowers spilled by angry peasants in front of the gates of sub-prefectures and the carcasses of cattle and the tons of butter withdrawn from the market to support the prices and piled up in the cold rooms of the European community. By founding the “Restos du cœur” in 1985, the humorist Coluche, supported by numerous stars of French show business, initiated both the mobilization of “well-fed” France and the change of the status of food. The right to food began to become a fundamental right. The movement spread throughout Europe, and soon charities working in this sector were recognized as being of public utility. The development of Europe agricultural further encouraged mobilization efforts.

At international level, the 1992 Earth Summit in Rio de Janeiro introduced the notion of ethno-diversity in Article 8 of the “Convention on Biological Diversity” signed on 5 June. Conceived to mirror the concept of biodiversity, it deals with the “conduct of societies” and calls for countries to respect, preserve and maintain the uses and knowledge of indigenous and local communities relevant for the protection of biodiversity. With the signing of the Kyoto Protocol in 1997, followed by the Johannesburg (2002) and Nagoya (2010) Summits – all places where alerts were issued and commitments made – the issue of sustainable development took shape and articulated the economic, environmental and social challenges. However, behind the apparent consensus, there is a misunderstanding: in the expression “sustainable development”, the “rich” emphasizes sustainability and the “poor” emphasizes “development” (Brunel 2008).

2 Population Dynamics and Politics

Population dynamics have been the subject of considerable scientific progress, particularly with the “demographic transition” model (Notestein 1944, 1948; McKeown 1976). It attempts to account for the impact of development factors on the demographic structure. The development is accompanied by a population growth that can sometimes be a factor of dynamism since the population is getting younger, with a favourable ratio between active and retired people. But these additional individuals also eat... This explains the frequent “stop and go” phenomena experienced by developing economies.

The definition of nutritional needs is too often based on the Western food model and should be diversified. Périssé (1996) defines six major families of food models according to the staple food (rice, wheat, corn, cassava, yam, etc.). In the field, the anthropology of food provides us with a considerably larger number of consumption models. Changes are also difficult to predict beyond certain summary rules,

such as the share of animal products increasing with the increase in purchasing power. Finally, the data available in many countries are to be taken with caution as it is very complicated to ascertain the informal economy. Moreover, in some countries, certain organizations may have an interest in aggravating situations in order to justify their existence or their requests for aid.

The modelling of food production might seem more manageable, but again, the more knowledge progresses, the more complex the issue becomes. The cultivated areas, water resources, sunshine and, more broadly, the climate, the type of seed, cultivation methods, soil amendments and methods of pest control, harvesting and storage are all interconnected variables, which determine productivity and which in turn have an effect on climate, water availability and so on. The models on which the predictions are based were, and will probably still be for a while, a little too simplistic. The gloomy predictions made in the past, be it by Malthus, the Club of Rome in the late 1960s or the ecologists of the 1980s have all been challenged by the facts. Prediction is a difficult art in general, and agronomy and demography are no exception. The present food production is much more than is needed to feed all the people on the planet. Unfortunately, however, there is still famine in one half of the world, while the other half is increasingly drowning in overabundance. The most optimistic will point out that the number of people suffering from hunger has not changed over the last three decades of the twentieth century and has even fallen slightly, while the world population has gone from 4.5 billion in 1975 to 6.1 billion in 2000. But others consider the current situation has worsened this last decade and is even more unbearable as we have the means to feed humanity. Jean Ziegler (2006), United Nations Special Rapporteur on the Right to Food, considers that agriculture today can feed 12 billion human beings (i.e. almost twice the world's population). "The 100,000 people who die of hunger every day are therefore murdered," he writes. With these words, he calls for collective responsibility. Therefore, the current situation is not caused by the incapacity to produce food to feed the planet, but by other political and economic reasons. The problem for the moment, and probably for some time to come, is not a problem of production, but a question of distribution, an economic issue, a political problem (Poulain 2018).

The situation worsened in 2008 as a result of several events: a year 2007 of very poor harvests in different parts of the world, the development of biofuels (especially in the USA from corn and in Brazil from sugar cane) and, finally, speculative movements which are the main cause of the worsening pressure on prices (Ziegler 2006).

3 The Importance of Modelling

Forecast errors should not prevent the interest in predictive models. Moreover, there is the possibility that if gloomy predictions on food and nutrition security have not come true, it could partly be due to the awareness they raised and which contributed to the reorganization of production and distribution systems and the implementation of new agricultural policies. The models are "simple", which is all the more reason

to try to improve them. To do so, let us look at the assumptions on which they are based.

Modelling work is located between two epistemological perspectives, between two more or less competing theoretical frameworks: an economic-ecological framework and a socio-anthropological framework (see Fig. 1). The first perspective focuses on rational intergenerational responsibility, i.e. the environmental responsibility of our generation towards future generations. It is embodied in questions such as: “What kind of land will we leave to our children?” or the following one “Can we live on credit on the backs of future generations?”. The second focuses on intra-generational responsibility, i.e. the ethical “scandal” of the discrepancies between the situations of individuals living in developed societies and those living in under-developed countries. It emphasizes the North-South relations and promotes fair trade and the respect of biodiversity and ethno-diversity (El Bilali 2019).

These two perspectives do not use the same scientific resources. The first takes econometrics, systemic ecology, etc. as a model, adopting an epistemological, objectivist and idealistic stance (seeking the major laws that structure phenomena). The second is enshrined in the logic of socio-anthropology and development disciplines and is subjectivist and empirical (concerned with the field and the vision of the actors). These two frameworks are in conflict with each other: one gives primacy to the ecosystem, the other to humans. The latter criticizes the former for building “off-ground” models unrelated to field data, and the former criticizes the low degree

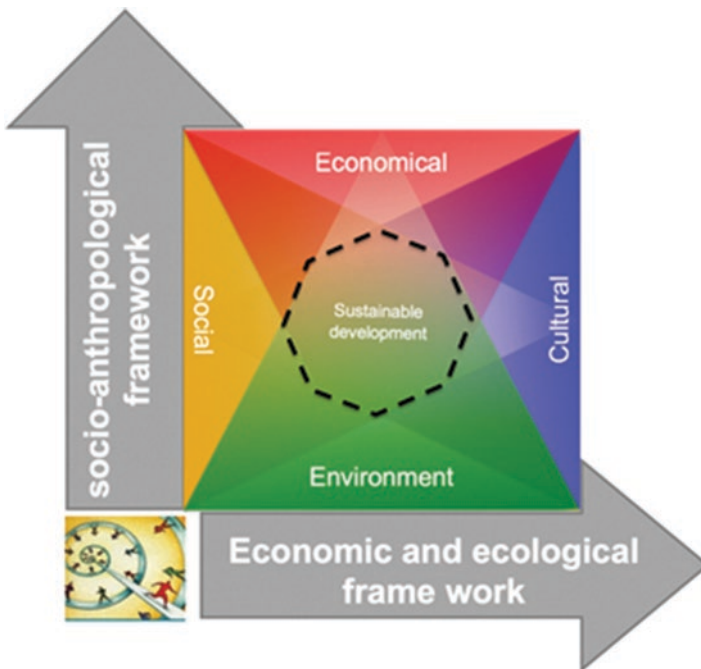


Fig. 1 Introducing cultural heritage into sustainability. Source: Poulain (2018a)

of generalization of the work of the latter. Table 1 summarizes the main tensions between these two perspectives on sustainability.

Predictive models are useful to professionals and politicians alike because they provide a global vision to help guide action. However, their rusticity can be avoided and the processing power available to contemporary research may create the possibility to consider the increasing complexity of these models. The example of the challenges of feeding humanity shows the interest of distinguishing, in the classical model of sustainable development, the social and cultural dimensions. That is to say, issues related to inequalities in the hierarchical scale and those related to ethno-cultural diversities. In the case of food, the firsts correspond to issues of accessibility, while the seconds take into account food cultures, types of food and the ways of preparing them.

Even if the current models are reductionist and unreliable, they still had the merit of sounding the alarm. It is possible to strengthen their predictive capacity by combining demography and nutritional anthropology. This involves replacing the “population” variable in Malthus’ model (which more or less assumed that all men eat the same thing) with “food need”. This is the result of the population and its transitional dynamics and the food consumption patterns they use. The enrichment of these slightly “off-ground” models therefore involves the introduction of demographic data to take account of population dynamics (stages of the demographic transition process) and anthropo-nutritional data that take account of the diversity of food models used by populations.

In the theory of “convergent modernity”, dominant in nutritional epidemiology as well as in business circles, the evolution of food consumption is supposed to be

Table 1 Paradigmatic tension of sustainability considering the economic-ecological and the socio-anthropological perspectives

	Economic and Ecological	Social and Anthropological
Key concepts	Priority to environment Ecological footprint, (km/food), CO ₂	Priority to human beings Fair-trade, sustainability, slow food, community-supported agriculture
Orientation and evaluation criteria	Universality of global ecological stakes Intergenerational equity What kind of planet will we leave to our children?	Specificity of social and cultural situations Intragenerational equity Solidarity with the victims of hunger and health scandals
System evaluation modality	Mathematical modelling	Case study, experience feedback
Market relation	The market is set, it is required to understand how it works	The market is a social and political construction. Action is necessary to orient it towards a beneficial situation
Position of consumers	Consumers make choices	Consumers are actors of the systems
Scientific disciplines	Econometrics, ecology, agronomy	Anthropology, sociology, sciences of development

Source: Stassart and Collet (2001)

in line with the Western model (Mahbubanim 2013). That is to say, make the distinction between the differences of practices linked to the social positions and those related to ethno-cultural belongings. If at the macro scale and in a very simplified conception of the protein transition, using only the opposition animal proteins versus vegetable proteins, this model has some consistency, as soon as the origin of protein sources is introduced in a more diversified way, it loses much of its relevance. Work on protein transition shows that each country follows a singular transitional path. It is because foods that are sources of protein are the subject of many taboos, religions or social and cultural prescriptions (including the issue of animal death for food) that the forms of nutritional and protein transitions are widely determined by cultures (Poulain 2007a, b, Fourat and Lepiller 2017, Drewnowski and Poulain 2019). We can see it, in a multicultural society like Malaysia where the three main communities (Malays, Chinese and Indians) have different forms of proteins transition (Drewnowski et al. 2020).

At the theoretical level, the challenge is to develop sufficient knowledge on food models to identify the room for manoeuvre they allow in the variability of needs. At the strategic level, ethno-culinary diversity (culinary systems) and ethno-food diversity must be considered as a resource and not as an obstacle. Taking it into account avoids putting all the eggs in the same basket.

As an extension of these reflections, it is possible to reorganize Malthus' model to better reflect the functioning of the global food system (Poulain 2007a, 2018a, b). It is characterized by food production capacity and food needs to be met. The production capacity is determined by a number of factors: the surface cultivated, the seeds used and the cultivation methods implemented, the inputs and preservatives used for raw products, the methods for preserving and transporting processed products and, lastly, the climate and its evolution. When talking about production, what Malthus called the "population" must be replaced by the "food need" to be satisfied. This need equals the number of mouths to feed (Malthus' population) and their numerical evolution. However not all people eat the same way. While the definition of an adequate diet can be defined in nutritional terms, there is also the matter of culture, tradition, religion, etc. to consider. It is therefore necessary to take into account the food consumption patterns used by various populations and any changes in these patterns (see Fig. 2).

Thus, two complementary perspectives for action emerge. The first calls for action on production capacity. This has been the lever used so far by agricultural and food policies. Great progress has been made, but not without some controversy over its health, environmental and social consequences (Ziegler 2006). There are several conflicting conceptions that can be placed on a continuum ranging on the one hand from the increasingly important and precise use of biotechnologies to act upon the natural processes underlying agriculture and on the other hand to agro-ecology, which is increasingly respectful of these same natural processes. Between these two poles, there is a wide range of positions. Whichever way you look at it, biodiversity is a resource across different philosophies.

On the food quantity side, there is another very important lever: that of reducing losses and wastage, which is estimated at nearly 30% of the quantity produced (FAO

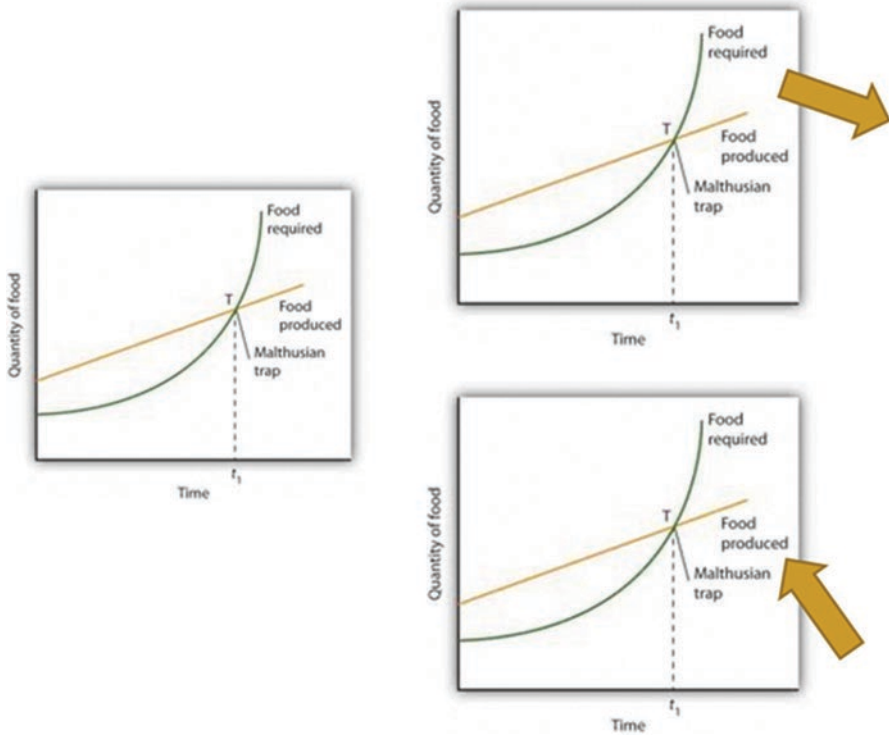


Fig. 2 Back to Malthus' theory: Levers of action. Food required strategy and food produced strategy. Available at: <https://bit.ly/3lg8ku5>

2013). Actions must be taken at the level of production, processing, and consumption. Such a project could lead to reconsidering animal nutrition models. But it is also possible to modify the expression of the need for food (and at the same time the resources needed to produce the food likely to satisfy this need) by playing on the nature of the food consumed, for example, animal or plant protein sources. Within these two broad categories, the sub-categories do not engage the same amounts of resources. It is therefore possible to act on the foods consumed to reduce the pressure on the ecosystem. However, the way in which animals are fed can considerably vary the environmental impact (Poore and Nemecek 2018) depending on whether they consume products that potentially put them in competition with humans or whether they process non-consumable products into protein. Moreover, this issue needs to be ecologically and culturally contextualized.

Consumption patterns and their transition dynamics vary significantly on a global scale (Drewnowski and Poulain 2019). They result from the use that human communities have been able to make of the resources made available to them in the ecological niche, the resources they have been able to implant and the systems of representations and values that have enabled them to use them in a meaningful way. Food biodiversity and ethno-diversity must therefore be taken into account in order

to build a more sustainable food system. It is urgent to start their systematic study (Dernini et al. 2013).

After showing how the interest in biodiversity had made it possible to recognize that of ethno-diversity, we proposed to reformulate the Malthus model. If this has made it possible to launch alerts, does it have poor predictive capacities? This is because it is poorly connected with the empirical data. The putting in relation of the “population” with the “food production” rests on presuppositions on the way in which the men satisfy their need for food which opens the door to ethnocentrism (in this case of the Western-centrism) and conceptions and evolutionists.

To get out of these obstacles, we have proposed to make the distinction, within the classical theory of sustainable development, between the “social” and the “cultural”. Then two scientific perspectives appear, the economic-ecological approach and the socio-anthropological approach, which make visible two dimensions of sustainability in apparent contradiction. The absence of such a distinction in the classical theory of “sustainable development” has the effect of hypertrophying macroeconomic movements and leaving the cultural variability of food needs in the shade. This theoretical clarification then makes it possible to come back to Malthus’s model by taking into account the way in which food needs vary in their modalities (types of food) and manage resource needs and different environmental impacts. By taking note that what people eat is largely defined by societies, the concept of food culture, which is heir to the notions of biodiversity and ethno-diversity, establishes a dialogue with the economy and nutritional epidemiology in the aim to better face the hunger and climate challenges looming in the more or less near future.

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