

Chapter 2

Is There Enough Food?

Abstract The perspectives adopted by the world's decision makers are diverse. The World Economic Forum says that the issues include the need to spread cash around more equitably, and manage water and aging. The simple fact is that *it does not matter how much cash you have in your pocket you will still go hungry if there is no food in the market*. The data in the FAO databases can be deployed to answer 'yes' and 'no' the question: 'is there enough fertile land on which to grow the food we need?'. Taken on a whole of world basis the answer is yes and, if we need to produce some more food, there is plenty of land available to do so. Going down one level to the continental level reveals that there is a considerable disparity in food production per person in Africa as a whole and in the USA. At the national level it is not difficult to deduce that many of the people of less developed nations are close to starvation, most of the time and that any attempt to draw conclusions from whole of world data are at the best naïve.

Keywords Africa • Agriculture • Agricultural land • Farming • Food riots • Food production • Hunger • Nutrition

A study by the World Economic Forum (2013) identified five risks of global significance to the future of our species: severe income disparity, chronic fiscal imbalances, intensification of greenhouse gas emissions, water supply crises, and the mismanagement of population ageing. All these risks will continue to have severe negative impacts on global food security, which is clearly the driving issue. But even if each of those five constraints to human wellbeing could be alleviated—some members of the human species would still have inadequate access to food, now and in perpetuity.

Comprehension of a fundamental issue seems to be missing in the deliberations of the World Economic Forum. It does not matter how much money we have to spend on food when we go to the market, if, when we arrive, the stalls are empty. The world does not produce enough food in all the right places so that every member of the human species can eat enough to prevent under-nutrition (insufficient energy intake) and malnutrition (caused by food with inadequate nutrient content).

An analysis of the FAO (Food and Agriculture Organisation) data base (<http://faostat.fao.org/>) by Maletta (2014) arrives at contradictory and misleading findings. His analysis led to the conclusion that all is well in the world. It showed that there is ample food for everyone and there is no shortage of land to grow it on, and to expand into should more space be needed.

These findings do not, of course, fit into reality. They result from the analysis of consolidated, whole world data. Maletta (2014) appears to have accepted the outcome on the basis that the world has a perfect, waste-free, boundary-free, food distribution process, and that we can either grow our own food or have equal and adequate access to the financial resources needed to buy the food we cannot grow ourselves (and to invest in farm inputs and infrastructure). The World Economic Forum had already scotched that one in 2013. There appears to be underlying assumption that all ‘crops and livestock’ are edible and that all land that is ‘not forested, not built-upon, not otherwise protected, and if not yet cropped’, is available for food production.

Maletta (2014) does not consider the land that is, for instance:

- too steep, too hot or too cold for cultivation,
- new, arid desert formed as a result of vegetation stripping and climate change,
- permanently or regularly inundated due to rising sea levels,
- toxic—for instance, vast areas of China are unsuitable for cultivation because industrial contamination has rendered them unsafe for food production (Wade 2013); and,
- heavily contaminated with salt.¹

Going down just one level from ‘all of world data for all crops’ to a comparison of a consolidated set of crop data from a continent (Africa) and a large developed nation (United States of America) tells us a lot more about the disparities within Maletta’s assumptions. The focus is on coarse grains—mainly maize/corn, considering the changes in mean production for 1961/1965 to 2006/2011) (Table 2.1).

It confirms that total coarse grain production on both land masses increased approximately threefold, but the area devoted to this crop decreased by about 10 % in USA and nearly doubled in Africa. There is a small increase in productivity in Africa ($\times 1.5$) compared to a large increase ($\times 2.8$) in USA. The data confirm that there is a lot of statistical ‘noise’ behind assumption of Maletta (2014) that the amount of land devoted to crop production has remained the same. The crux of this matter is that production per person *increased* by 300 kg/year in USA but, in

¹This reflects 930 million hectares in 1998 or 7 % of the world’s total land area. This area has increased since, due to indiscriminate pumping of ground water. The worst affected areas are in South Asia, the southern Sahel, northern China and northern Australia although there are many lesser affected areas worldwide (Nortcliff 2012). Farming has destroyed huge regions of natural habitat. To feed the global population expected by 2050, more than 1 billion hectares of wild land will need to be converted to farmland if current approaches continue to be used (Sachs et al. 2010; Tilman et al. 2001).

Table 2.1 Comparison of coarse grain production in USA and all of Africa: mean data for 1961–1965 and 2006–2011

Parameter	Period	Africa	USA	USA/Africa
Coarse grain production ($\times 10^6$ MT)	1961–1965	39.5	133.1	3.37
	2006–2011	109.3	326.8	2.99
Area harvested ($\text{ha} \times 10^6$)	1961–1965	48.8	41.8	0.86
	2006–2011	90.3	37.2	0.42
Production per person (kg)	1961–1965	129.5	703.7	5.43
	2006–2011	110	1070	9.68
Productivity (MT/ha)	1961–1965	0.81	3.19	3.94
	2006–2011	1.27	8.95	7.04

<http://faostat.fao.org/>

Africa, *decreased* from a low base (for a staple food item) of 130 kg/person/year in the early sixties to 110 kg/person/year in about 2010.

Taking this down a further level to look at FAO data for a specific developing nation further illustrates the reality of the problem and the fallacy of argument in Maletta (2014). Madagascar is an island nation of 592,800 km² and 22 million people. It is 450 km² (closest point) from the coast of Mozambique and occupies approximately the same latitudinal range. Much of Madagascar receives significant rainfall for most of the year, and climate change manifests as increased cyclonic activity and not as desertification. The nation is ranked 151 poorest out of 187—meaning that there are 36 countries even poorer. Most people live in rural areas. The average calorific intake is 1844 kCal/per day/person (Table 2.2).

The *average* diet is largely (74 %) made up of rice and cassava. These products have high carbohydrate contents and little of anything else required to provide a nutritious and balanced diet. The ‘healthy’ dietary components that supply protein, fat, and vitamins and minerals are linked to only 7.5 % of the caloric intake. This diet is indicative of under-nutrition and of malnutrition in that the energy intake is less than that required by the average adult in Madagascar (2500 kCal/person/day) and is largely carbohydrate (starch) in content (FAO 2004). *This is the average*. Data by percentile has not been located. We wonder how people in the lowest quartile survive. The current rate of population increase in Madagascar is high at 3.6 % per year. Malthusian theory may well limit that growth rate through civil unrest or mass starvation.

Concurrent with Maletta’s paper the Cambridge Institute for Sustainability Leadership (CISL) published a report, ‘The best use of UK agricultural land’ (CISL 2014). This holistic and objective report takes into account the multifunctional nature of agricultural land—food and energy security, environmental stabilization and conservation, farmer income, and recreation in another island nation.

Apparently, the UK is heading for trouble. The future demand for land is far greater than that which is available. Various scenarios are modeled. In the best case the UK will be 0.9 million hectares short of the land needed to support a predicted population of 70 million by 2030 (CISL 2014). In the worst case scenario the short

Table 2.2 The top 10 food items consumed in Madagascar, and the average energy they provide per person per day

Commodity	KCal available per person per day
Rice (milled)	1052
Cassava	309
Maize	144
Sugar (raw equivalent)	74
Wheat and products	64
Sweet potato	62
Milk (excl butter)	45
Beef	38
Fruit	32
Banana	24
Total	1844

Source FAOSTAT, FAO of the UN. <http://faostat.fao.org/site/368/default.aspx#ancor/>
http://faostat.fao.org/CountryProfiles/Country_Profile/Direct.aspx?lang=en&area=129

fall is 6 million hectare. This is based on the assumption that the current availability is 18 million hectare. Lack of land on this small island nation will mean that UK needs to make tough choices to get the maximum from its 18 million hectares of farmland. Interestingly, the CISL supports the notion that perennial energy crops have a place in multifunctional agricultural systems, even though access to land will be difficult. Maletta (2014) supported the same notion on the basis that land is abundant.

There are more highly relevant insights that have appeared in discussion groups and the press. The first is that the world does produce enough food but it is not all in the right place. The raw data (http://faostat3.fao.org/browse/D/*EO) indicate that this is almost true. The world ‘dietary supply adequacy’ is running at 122 % for 2014 (113 % 1992). The average prevalence of ‘undernourishment’ has fallen from 18.7 % in 1992 to 11.3 % in 2014. Obviously the trends are in the right direction, but as illustrated above the devil is in the details. Some localities can produce more than is needed for local production and could export to other places—but who is going to pay...and if someone does pay—is that a good thing? Should not the trend be to encourage self-sufficiency? In the case of the FAO data, the meaning of ‘undernourished’ is not clear.

Does it mean enough food to keep a body ticking over, if so there are a lot of people (half of 11.3 % of the world population) in a worse condition than ‘undernourished’. It is conceivable that this sector of the world population has a much higher mortality rate. When they die the small amount of food that they might have eaten contributes to the wellbeing of the people who are less undernourished—this would explain the reduction in the number of undernourished in the FAO data. What appears to be a positive trend may mean the opposite. The data may show that more people die of starvation every year so that there are fewer people who are undernourished...?

The second discussion area focuses on the prime land that is occupied by crops, worldwide, that are processed to capture their energy content—either as ethanol or other biofuels. The ensuing discussions point out that we need to run our motor cars so it is better to deploy solar energy converted into biomass and liquid fuel than fossil fuels. The counter argument indicates that there is plenty of marginal land around the world—why not plant energy crops that can thrive in these conditions, instead of wasting water, fertilizers, and other inputs on land that should be preserved for food production. This is discussed further in Chap. 8.

Related to this are the comments of Olivier de Schutter, as Special Rapporteur on The Right to Food to the United Nations Organization, from 2008. “... I took on the role in 2008, just as food prices were soaring to unprecedented heights on global markets. Food riots ensued and hunger deepened in poor, food-importing countries ... The imbalances of our food systems, which had been building up over the past forty years, suddenly became visible... the global food supply was only a few spoiled harvests away from failing to meet global demand. But we also glimpsed the unjust logic at the heart of our globalized food systems: populations with widely divergent purchasing powers have effectively entered a bidding match for limited—and ultimately finite—resources”. He goes on to describe how wealthy nations are taking over the land of the poorest, and how the equity issue has to be addressed. The imbalance is too great to hope for a rapid change (de Schutter 2015). The example we use is that in Madagascar diesel fuel, a basic commodity in the ‘West’, costs US \$1.00, the same as a day’s wages. How can an impoverished economy progress when the essential elements are beyond the reach of so many?

All is not as well in the world as Maletta (2014) would like us to think. This is why we are so concerned about food security in the coming era. The basic resource—‘land on which to grow food’—is declining in area and quality. Freshwater and marine food-stocks are as challenged as land based food production systems; however, parallels with the impact of climate change and pollution can be drawn and the waste issue is no less, probably more, because of the by-catch issue but adding them to this discussion adds too much complexity.

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