

Chapter 53

Food and Environment: A Review on the Sustainability of Six Different Dietary Patterns

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ABSTRACT

Recent studies related the link between food consumption and impacts on environment and health. These may present variations according to the dietary patterns of different populations. This chapter assesses the impacts of six dietary patterns while emphasizing protein overconsumption and sustainability of food systems in a world where one billion people are hungry and several more suffer from conditions related to obesity. The chapter shows the nutritional disparity existent in different dietary patterns and potential to make changes. Changes in dietary patterns are an opportunity to contribute for environmental and health benefits. The analysis was based on a set of environmental indicators such as greenhouse gas (GHG) emissions and land use demand, while providing a nutritional balance. The methodology comprehended a life cycle assessment in order to quantify the GHG emissions and the land use demand for food production. Finally, a review is made to focus on the benefits of shifting from current diet patterns to more sustainable ones, such as the Mediterranean.

FOOD AND ENVIRONMENT

With the fast growth of cities and the increase in world population food needs keep increasing in order to face the demands. This demand is responsible for the increase of pressures over the environment. The priorities for the communities' well-being become interlinked with those regarding environmental conservation (Johns and Eyzaguirre, 2001; Chan et al, 2011). Nutrition is the most fundamental aspect for the human needs; deficient nutrition can lead to health problems such as malnutrition, infectious diseases, contamination and also obesity (FAO, 2011). Environmental contamination from industrial sources such as heavy metals and organochlorines can contribute to people's nutrition and health. The main challenge of food for the 21st century is to try to understand how diets can respect the body's needs of nutrients and energy while maintaining the balance of ecosystems and respect cultural differences between communities.

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The quality of the environment is vital to the quality of food, since in every region, each species is adapted to the local conditions, if these change, the ecosystems will be impacted, thus, plants and animals will also have to adapt in a direction that may be less productive and even lead to extinction (OECD, 2011). Not every impact is easily predictable, for instance, it is common sense that a forest fire will have severe impacts on the ecosystem, however, what are the effects of climate changes on the productivity? Although several sources point out that many cultivated plants will react positively to the predicted increase of carbon dioxide in the atmosphere, weeds will also react favourably, which can lead to a decrease in soil, thus, leading to the increase in the use of pesticides with potential negative impacts over agriculture. These risks will contribute to a decrease in food safety, especially to those who depend on agriculture for food and income (Oenema et al., 2007; Cassman et al, 2003). The quality of environment in which food is produced also translates, according to FAO (2011) into three classes of potential croplands: prime, good and marginal. About 81% of the cultivated land is classified either as prime or good, which means that 19% have its productivity determined by adding other inputs, this percentage of cultivated lands add negative impacts to the environment and the balance of ecosystems.

The conversion of lands with low productivity in terms of food production will decrease its capacity to provide other goods and services. It is precisely in such situations that land use and its proper management has impact on both food production and environmental sustainability. Regarding water, its quality is essential for populations in terms of consumption and use for agriculture and livestock production. However, it is also used for activities like production and processing of food, its preparation and also for disposal of waste. Since agriculture is highly dependent on water, its scarcity will affect either the quality of produced food, or the water availability needed for livestock. The current patterns of use of water for agriculture are unsustainable with several negative impacts requiring an efficient approach for its use (FAO, 2011). The production or value of crops per volume of water utilized will be a decisive factor into the choices in land management for agriculture. This indicator is currently low (OECD, 2008) since the losses of water are around 50% due to ineffective practices or lack of investment in new technologies such as low pressure sprinklers or drip irrigation.

In a world where it's expected to have less availability of water for agriculture due to the effects of climate changes and with the fertility of soil decreasing with the abundant use of inputs to force high productivities, it is essential to establish efficient practices for water consumption, while maintaining the soils structure without the use of inputs and pesticides that damage not only surface water but also groundwater. Regarding climate change and its effects on water, it is expected to impact the availability in many regions, affecting the precipitation, hydrologic flows and recharges of groundwater, water quality will also be compromised due to the flooding of fertile coastal regions due to sea level rise (IPCC, 2014). An European Commission study (EC/JRC, 2009), showed that food consumption represented 27% of all environmental impacts in the EU-27, and enhanced a prominent role of meat production on environmental impacts generated along the food chain.

The environment has influence on the quality of food, but the food systems also have impacts over the environment since these use natural resources and depend on human activities. There's still a wide use of fossil fuels to produce, process and transport food which contributes to an increase of carbon dioxide emissions into the atmosphere, the use of inputs lead to the emission of nutrients to water bodies. Food production will always have impacts on the environment since activities such as agriculture and livestock production are open systems based on natural processes, meaning that there's the need of a system in order to manage, control, prevent and if possible avoid effects on the environment (Vermeulen et al., 2012). In Table 1 are synthesized main environmental damages related to each cycle of food, from its production to its waste.

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