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Long-term global availability of food: continued abundance or new scarcity?

Technical background report

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Aknowledgement

All chapters of this report have been reviewed by the expert group on long-term global availability of food. The group consists of Tiny van Boekel, Willem Brandenburg, Martin van Ittersum, Roel Jongeneel, Niek Koning (all staff at Wageningen UR) and Maarten Smies (from Shell International). For individual chapters, additional support was received from Ekko van Ierland, Sjef Kauffman, Godert van Lynden, Roel Oldeman, Arnold van Huis, Huub Stoetzer, Jetze Stoorvogel, and René Wijffels.

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1. Introduction

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This report forms the background information for the project entitled 'Long-term global availability of food – continued abundance or new scarcity?' The report aims to present an overview of the issues that relate directly or indirectly to the world's food availability. The report limits itself to the supply side of food: its future limitations and growth possibilities. The document covers a wide variety of topics and attempts to address the most relevant issues connected to the future world food supply. However, we do not wish to be prophetic or draw any definitive conclusions on the basis of this material, as we would like to leave this to the agricultural experts that will be present at the workshop on January 26th, 2006. Moreover, this report constitutes input to that workshop.

The project follows on from a debate that was started in the nineties in which two contradicting theories developed concerning future world food supply. On the one hand, Neo-Malthusians, like Lester Brown, debated that future scarcity of food was inevitable. According to this theory, high population growth and diet change will automatically lead to an insufficient supply of food. On the other hand, institutes like IFPRI and FAO developed models that concluded the exact opposite. Improved agricultural and food technologies would easily be able to cater for the growing world population. It is these models that are commonly accepted today. Nevertheless, they are still open to questions. Studies that explore technical limits have to establish what these limits really are. Studies that project actual developments wrestle with non-linearities that complicate any attempt at long-term prediction. The project explores some of these complications. It tries to identify biophysical and social forces and non-linear interactions that critically influence the supply side of the world food situation in the long term. The aim is to develop a research agenda that considers both technical and social feasibilities and is scientifically interesting and relevant for policy makers.

In the project, two models have been taken as a point of departure for the analysis. The models used are: (i) the Limits-to-Food-Production model developed at Wageningen University and (ii) IFPRI's IMPACT model. Peter Buhring developed the Limits-to-Food-Production model in the mid-seventies. It is based on agronomic drivers and assesses potential world food availability purely through available land and crop production possibilities (in a high- and low input scenario). IFPRI's IMPACT model, on the other hand, is an economic equilibrium model of the supply and demand of food. Greater demand is accommodated by larger investments. Different scenarios have been developed for various trends and regions.

This report examines the issues influencing world food production that might alter the outcome of the two models. In chapter 2 the influence of changing ecological conditions will be discussed, describing the consequences that climate change, soil degradation and emerging animal and plant diseases can have on the future of food production. In chapter 3 the consequences of novel techniques in food production will be examined, with the focus on plant and animal production, non-farm production and improved processing of food. Chapter 4 presents the competing claims on natural resources, dealing first with the competing claims on farm resources for non-food applications (like fibre and bio-fuels). Secondly, it elaborates on the non-farm claims on land and water (like recreation, nature and hard infrastructure). The report ends with a more philosophical discussion on the possibilities of shortages in food production, focusing on the concepts of resilience, vulnerability and risk, and the dynamics of the future of world food availability.