



# MEGATRENDS IN FOOD AND AGRICULTURE

TECHNOLOGY, WATER USE AND NUTRITION

HELMUT TRAITLER | MICHEL DUBOIS | KEITH HEIKES | VINCENT PÉTIARD | DAVID ZILBERMAN

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**Highlights and examines the growing convergence between the food and agricultural industries—the technological, environmental, and consumer-related drivers of this change, and the potential outcomes**

This is the first book of its kind to connect food and the food industry with agriculture, water resources, and water management in a detailed and thorough way. It brings together a small community of expert authors to address the future of the food industry, agriculture (both for plants and animals), and water—and its role in a world of increasing demands on resources.

The book begins by highlighting the role of agriculture in today's food industry from a historical perspective—showing how it has grown over the years. It goes on to examine water management; new ways of plant breeding not only based on genetic modification pathways; and the attention between major crops (soy, corn, wheat) and so-called "orphan crops" (coffee, cocoa, tropical fruits). The book then turns towards the future of the food industry and analyzes major food trends, the new food, and "enough" food; discusses possible new business models for the future food industry; and analyzes the impact that the "internet of everything" will have on agriculture and the food industry. Finally, *Megatrends in Food and Agriculture: Technology, Water Use and Nutrition* offers scenarios about how agriculture, food, and the food industry might undergo some radical transformations.

- Assesses the evolution of food production and how we arrived at today's landscape
- Focuses on key areas of change, driven by both innovation and challenges such as new technologies, the demand for better nutrition, and the management of dwindling resources
- Highlights the role of better-informed consumers who demand transparency and accountability from producers
- Written by industry insiders and academic experts

*Megatrends in Food and Agriculture: Technology, Water Use and Nutrition* is an important resource for food and agriculture industry professionals, including scientists and technicians as well as decision makers, in management, marketing, sales, and regulatory areas, as well as related NGOs.

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Megatrends in Food and Agriculture



## Foreword

The right to food is a human right. A free exchange of ideas and knowledge that support culturally appropriate food selections produced with the sustainable needs of the grower, consumer, and land “top of mind” are global issues and inherent duties that resonate across all sectors of today’s agriculture and food industry. This is especially relevant in Hawai’i’s agriculture and food industry, where actions to ensure future generations the gift of a communal table that is abundant, vibrant, tasteful, and nutritious are challenged by insecurity. Stimulating local, national, and global food production levels based on sustainable, environmental, social, and economic virtues will continually play a significant role in reducing worldwide food security fears.

In Hawai’i, which in small ways mirrors much of the wider world of agriculture and food, collaboration is occurring across our island state that seeks to rebuild cultural linkages among agriculture, food, and community values. Discussions are increasingly focused on new thought patterns that would encourage a return to agricultural practices that support sustainable food systems and water-management practices that place nature’s goodness and personal wellness in the forefront as local residents and island visitors make informed decisions toward virtuous food choices.

That the State of Hawai’i currently imports 85% of its food is an ongoing dilemma. The cost of living in Hawai’i, at 167% the US national norm, is the highest in the nation. The annual mean wage is well below the national average, driving many residents to work multiple jobs to simply afford the high costs of food. Agriculture and food production have been identified as the number-one-targeted industries required to strategically diversify and strengthen the economy by providing jobs with a living wage, increase GDP to lower local food costs, and increase the long-term sustainability of Hawai’i as a geographically isolated island in the event of a natural disaster.

Aggressive measures to reverse imported food reliance as well as increase capacity for local food production and food product development is necessary for Hawai’i’s agricultural future, and not surprisingly, reflects a much more global theme. Value-added options for local agricultural crops have been



identified as a key need. The ability to manufacture new and value-added food products is especially critical on neighbor islands such as Maui, where agriculture plays a significant role in the economy and markets for fresh produce are limited. In other states and nations, Food Hubs & Innovation Centers have created millions of dollars in revenue by helping food producers achieve higher value from culls and excess produce by extending shelf-life through quality processing, offering high pressure and reduced oxygen packaging systems, opening new export markets for sales, and providing training programs to farm and food entrepreneurs to meet or exceed today's stringent food safety regulations.

Maui County, in particular, is at a critical economic juncture with the closure of Hawai'i's last remaining sugar plantation, the Hawai'i Commercial & Sugar Company. The closure brings the loss of hundreds of jobs along with the opportunity for small farm, diversified agriculture, and food-related business growth on 36,000 acres of now vacant land. The County of Maui is at the brink of economic distress and at the same time unlimited opportunity to develop small businesses in the food and agriculture industries to foster job creation, promote private investments, and diversify the financial options and stability of its residents.

Hawai'i has a deep responsibility to provide high-quality affordable food to advance our people, our communities, and our islands. Such a large mission requires a celebration for diversity in production, respect for land and water and care for those committed to wholesome food and agricultural practices.

Helmut Traitler's and his co-authors' *Megatrends in Food and Agriculture* serves as a "best in field" resource to help all sectors of Hawai'i's food industry—from large mono-crop producers, major political decision makers, and young food businesses—identify their strengths, weaknesses, opportunities and threats, then address those issues successfully to ensure that the right to food is continually valued.

Beyond the shores of Hawai'i, *Megatrends in Food and Agriculture* offers a borderless canvas to organically seed-stimulating study, conversation, and action concerning the future development of sustainable agriculture systems, new emerging food industries, and innovative technological services that rightfully place the human condition first in all thoughtful agriculture practices and food pursuits.

Chris Speere  
Site Coordinator & Food Specialist  
Maui Food Innovation Center, December 2016

## Acknowledgments

Once again, this was not an easy book to write. Although I consider myself a fairly cognizant expert in most matters food, agriculture, yet so close to food, always seemed so detached and far away from all these ever-important considerations and thoughts regarding food. So this is my first foray into the world of agriculture as it links to food, and it was clear to me from the onset of this project that I had to invite top-class experts in the relevant fields of plant and animal agriculture, and at the same time cover the vastly important field of water.

I was lucky enough to find the right experts who have contributed in important ways to the successful creation of this book. My thanks go to David, who with help from Ben Gordon, Research Assistant at University of California–Berkeley, has so skillfully crafted Chapter 2 and thoroughly highlighted all critical topics around water and water management of importance to the well functioning of any farming activity and beyond. My good friend Vincent and his colleague Michel, both top-class experts in their field, and with the help of Fatma Fourati-Jamoussi, Associate Professor at UniLaSalle, INTERACT Research Unit, Beauvais, France, have painted an important picture in Chapter 3 regarding modern plant agriculture, especially the themes of advancements in modern plant breeding outside the still highly contested area of genetically modified plants. Let me also express my special gratitude to Keith Heikes, who despite a busy calendar filled with many professional obligations, found the time to write Chapter 4, on the agriculture of animals.

In pursuing this project, I have again learned so much and gotten a better understanding of the intimate connectedness of agriculture and food. I am convinced, more than ever, that we have to increase our vigilance and level of caring for an often fragile agriculture industry, and especially the productive part of farming in all its facets. For this recognition I am particularly grateful.

This is my fourth book on a topic related to the food industry in a rather short period of time, and I am always surprised that after having written the first page I actually make it to the end. A very special thank goes to my wife

Thérèse, who like in the previous books, was the one who brainstormed with me on chapter outlines and contents, and all this from an unsuspected and untainted, just pragmatic and rather innocent position. My son Nik Traitler, like in my other book projects, helped me designing most of the figures.

I would also like to thank my dear colleague Chris Speere, who took it to write a fitting foreword to this book. Being from Hawai'i meant that Chris brought an important insular and well-defined view to this story.

Finally I would like to express my sincere gratitude to our publisher Wiley Blackwell and the entire team behind this project for their continued trust in the ability of me and my co-authors to not run out of ideas to share with our readers. For being here at this point of reading, I want to send you, the readers, my special thanks!

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