

Change

magazine

Floriade Dialogue The Self-Supporting City

An ongoing international
debate on sustainable food,
agriculture and horticulture



International participants Floriade 2012



- | | | | | |
|----------------|-----------------|-----------------|-----------------|-----------------------|
| 1. Afghanistan | 10. Germany | 19. Israel | 28. Nepal | 37. Taiwan |
| 2. Azerbaijan | 11. Ecuador | 20. Italy | 29. North Korea | 38. Thailand |
| 3. Bangladesh | 12. Estonia | 21. Japan | 30. Pakistan | 39. Trinidad & Tobago |
| 4. Belgium | 13. Ethiopia | 22. Yemen | 31. Peru | 40. Czech Republic |
| 5. Bhutan | 14. Philippines | 23. Kenya | 32. Russia | 41. Tunisia |
| 6. Bolivia | 15. Gambia | 24. Luxembourg | 33. Slovakia | 42. Turkey |
| 7. Bulgaria | 16. Greece | 25. Morocco | 34. Spain | 43. South Korea |
| 8. China | 17. India | 26. Mexico | 35. Sri Lanka | |
| 9. Colombia | 18. Indonesia | 27. Netherlands | 36. Sudan | |



Smart thinking

Today we are facing the major challenge of determining how to feed 9 billion people by 2050. World population numbers will continue to rise over the next decades, as will levels of prosperity and urbanisation. In countries such as China, India and Brazil, these factors will double the demand for food and greatly increase general consumption levels. It is evident that little new agricultural land will become available and that resources such as phosphate, fossil fuels and water are limited. Therefore, we need to search for smart, efficient and sustainable solutions to feed the world.

The Netherlands can play an important role in this search, because the Dutch approach to agrofood has proved very successful. The strongest point of the Dutch agrofood sector is the application of knowledge and technology; we are leaders in that respect. Raising productivity elsewhere in the world to the level of our sector would already have a huge impact. For example, we could reduce the current population of pigs and cows to one third of its current size and still meet current demand. This would save an enormous amount of space and raw materials and help to cut down emissions.

Traditionally, the Dutch sector has focused on innovating and improving source materials, cultivation systems and technology. Even as early as the 1980s, the end was predicted for greenhouse agriculture in the Netherlands, with energy costs going through the roof and Dutch-grown tomatoes and peppers holding a weak position against the competition. Yet we now have the necessary technology available to turn

our greenhouses into net suppliers of energy, which turns our relative disadvantage into an advantage. The Dutch horticulture yields per square metre are five to ten times higher than elsewhere, and the use of water and fertilisers per kilogram of product is the lowest in the world. All these improvements have gone hand in hand with an increase in product quality. The time when Dutch tomatoes still received negative reviews from abroad is far behind us; the range of differently shaped and coloured varieties is enormous and appealing.

All this thanks to a powerful combination of smart technology and expert entrepreneurship that is recognised worldwide: the 'golden triangle' of entrepreneurs, scientists and governments at its best. It is no coincidence that mega city Beijing wants to collaborate with Wageningen UR and Dutch companies to increase food self-sufficiency as well as to improve food security.

In short, we have something to offer to the world, and we are not afraid to say it or to show it. Floriade is the ultimate platform for the Dutch horticulture sector to do exactly this in an inviting and challenging way. Floriade Dialogue ensures that knowledge about the food-supply chain is shared. It is a step in the right direction in terms of solving issues related to sustainable and high-quality food supplies in 2050. Perfect!

Dr. Aalt A. Dijkhuizen
President of the board of directors
Wageningen University & Research Centre

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The High Tech Greenhouse 2020 gives you an insight look into the greenhouse of the future.



PHOTO: DFO AMSTERDAM

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“We have to start asking different questions to get different answers.”



Frances Moore Lappé

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Berry Marttin, Executive Board Member of Rabobank Nederland.



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Organisations and retailers increasingly wish to understand the sustainability performance of horticultural products, such as CO₂ emission.

Cover Photo: Floriade

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Colophon

This is a special edition of **Change Magazine for Floriade Dialogue, B2B platform of Floriade 2009-2012**

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Dialogue for Change

The terms 'dialogue' and 'change' on the cover of this magazine are chosen carefully. Alongside our ambition to present state-of-the-art developments in horticulture, Floriade 2012 also feels the need to convey a new, sustainable message from Venlo to the world, through Floriade Dialogue and this magazine: 'Structures for a living and self-supporting city from an aesthetic, economical and ecological point of view'.

Floriade is a truly international platform for knowledge exchange. In collaboration with Bureau International des Expositions (BIE), we have turned Floriade into a World Expo. Ever since the first World Expo in 1928, BIE's key concepts have been 'Trust, Solidarity and Progress'. Our objective is to create a grand collaborative event, with a focus on education and communication, which helps to build trust and establish relationships between governments and civil society. Expos such as Floriade are powerful catalysts for bridging the gap between various disciplines and achieving progress.

During the expo, Floriade Dialogue will be the platform for relevant discussions on Green Growth, issues bearing close relation to content discussions at world conferences such as Rio +20. Since Floriade Dialogue Sessions started in 2009, topics discussed have included: 'visions for urban structures', 'natural balanced water use', 'urban ecological engineering', 'water efficiency', 'innovation in food production' and 'efficiency in global agrofood production and logistics'. The main focus of each session was on establishing relationships between management, science

and practice. The outcomes should culminate in a coherent vision of the self-supporting city.

Our mission is to use the Cradle to Cradle framework as an innovation engine: 'We are native to our place', 'Our waste equals food', 'Sun is our income', 'Our air, soil and water are healthy', 'We design enjoyment for all generations' and, last but not least, 'Our goal is a delightfully diverse, safe, healthy and just world with clean air, water, soil and power – economically and elegantly enjoyed'.

This very first issue of **Change Magazine Floriade Dialogue** gives everyone who is interested in Green Growth and sustainable innovations, a glimpse at the future relationship between horticulture, food supply and the city. The reader is transported to the fastest growing cities, faced with the challenge of feeding their millions. The High Tech Green House shows a glance at the technical future of horticulture. A unique project in Mali predicts a future that benefits both local farmers and the environment. Managers, bankers and scientists share their visions of naturally balanced use of resources and sustainable food supplies capable of feeding 9 billion people.

Dialogue for change.
That is our ambition.



Dipl.-Phys. Sven Stimac
Project Director Floriade 2012



Agenda upcoming events

Thursday 10 May 2012 (09.00–17.00)

Floriade Dialogue #6: Institutional transformation: transition for the highest value of resources

Thursday 31 May 2012 (16.00–20.00)

Floriade Dialogue B2B evening reception: Logistics

Wednesday 20 June 2012 (09.00–17.00)

Floriade Dialogue #7: Improving productivity and logistics: Efficient food production

Thursday 28 June 2012 (16.00–20.00)

Floriade Dialogue B2B evening reception: Green living

Monday 2 July 2012 (09.00–17.00)

Workshop High Tech Greenhouse #2

Thursday 5 July 2012 (09.00–17.00)

Floriade Dialogue #8: Food sufficiency and quality: A revolution of sustainable approaches

Thursday 26 July 2012 (16.00–20.00)

Floriade Dialogue B2B evening reception: Cultures of the World

Tuesday 28 August 2012 (09.00–17.00)

Workshop High Tech Greenhouse #3

Thursday August 30 2012 (16.00–20.00):

Floriade dialogue B2B evening reception: Health

Monday 3 September 2012 (09.00–17.00)

Floriade Dialogue #9: The role of the self-supporting city

Thursday 27 September 2012 (16.00–20.00)

Floriade Dialogue B2B evening reception: Food

Monday 1 October 2012 (16.00–20.00)

Workshop High Tech Greenhouse #4

Floriade Dialogue

An ongoing debate on sustainable food and agriculture

‘Be part of the theatre of nature; get closer to the quality of life.’ That’s the motto of Floriade 2012, not only in words, but also in action. In 2009, Floriade founded a scientific and practical support program named Floriade Dialogue 2009–2012.

XANDER DE BRUINE

Floriade Dialogue is an international platform and network that stretches far beyond Floriade 2012 and the boundaries of the Expo site. It brings together international professionals within the field of science, business and government to discuss topics such as safe food production, responsible use of natural resources and green architecture and business. The outcome of the dialogue sessions is summarised under the title: ‘The Self-Supporting City’.

The emphasis of Floriade Dialogue is on influencing the process of social change needed to deal with the limitations of natural resources. It is an impetus to achieve intentions, collaborative arrangements and a multidisciplinary approach that will give context to future plans for 2020–2030. Floriade Dialogue will deliver a grid for the ultimate form of a self-supporting city, owing to the contributions of an impressive

network of specialists, each from different perspectives of policy-making, science and economy. Since Floriade Dialogue started in 2009, the initiative has grown rapidly and the network now has over 500 international contributing experts.

The goal of Floriade Dialogue is in alignment with the vision of the Bureau International des Expositions (BIE). This inter-governmental organisation has officially recognised Floriade 2012 as an A1 category International Horticultural Exposition. BIE’s mission is for countries to share their knowledge and experience through World Expositions. In cooperation with BIE, Floriade 2012 is expanding its International Horticultural World Exposition to a World Thematic Exposition.

Floriade Dialogue will develop a *vision* and *practical approaches*, a *statement* and *consensus* between participating countries at Floriade 2012.

FLORIADE DIALOGUE PARTNERS:

Rabobank, Arcadis, Dutch Product Board for Horticulture, Wageningen University & Research Centre, Food & Agriculture Organization (FAO), Fresh Park Venlo, Dutch Government & European Commission.



Frances Moore Lappé



Ellen Beerling



Tristram Stuart

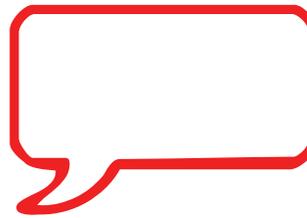


Jippe Hoogeveen



Jack van der Vorst

Floriade Dialogue Quotes



“Light+Soil+Water = Wealth.”

Cristina Gutiérrez-Cortines, President of the European Water Forum at the European Parliament in Brussels

“Every man must eat, just as we need to breathe and sleep. This makes food – and even more so the way we eat – a powerful tool for permanent change.”

Frances Moore Lappé, Author, and co-founder of three organisations, including Food First

“The largest portion of a water footprint comes from the field, not the factory.”

Jan Burger, Environmental Sustainability Director of Coca-Cola Europe

“Horticultural products are also a source for medicine, health care, energy and clean products. So they can contribute to a more sustainable society.”

John Boon, Head Designer at Floriade 2012

“Metropolitan agriculture and agroparks: keystones for sustainable development in agriculture and food security.”

Madeleine van Mansfeld, Ecologist with the Landscape Systems team at Alterra

“Reintroduce water in the city with new ways of storing rainwater through the introduction of green and underground areas.”

Piet Dircke, Global Director of Water Management Arcadis

“Redefine the quality of food products to reduce waste.”

Tristram Stuart, Winner of the International Environmental Award, The Sophie Prize 2011

“Green matters: ‘green’ is an urban establishment factor.”

Charlotte Buys, Senior Designer at the City of Amsterdam Planning Department

“The level of pesticides and fertilisers in our water is above the norm for good water. The task for growers is to reduce these levels.”

Ellen Beerling, Senior Researcher at Plant Research International (PRI), Wageningen University

“An enabling environment and enough new arable land are key to food security and production.”

Hans Biemans, Head of CSR Business Development at Rabobank Nederland

“Adapt response to local conditions to cope with water scarcity.”

Jippe Hoogeveen, Technical Advisor at the Water Development and Management Unit, FAO

“Malmö’s parks are its identity.”

Arne Mattsson, Deputy Head of the Streets and Parks Division of the City of Malmö

“More supply-chain collaboration is needed to strengthen international trade networks and agrolistics management.”

Jack van der Vorst, Professor of Agricultural Logistics and Operations at Wageningen University

“The future of natural resources lies to a large extent in the hands of land managers. Final decisions on resource management are taken at local level.”

Ana Rocha, Policy Advisor at the European Landowner’s Organisation

Floriade Dialogue 2009-2012



Specialists in the fields of Urban Development, Water Management, Landscape Architecture, Agricultural Food Production, Business & Consumer Awareness Responsibility and Water Stewardship have been invited to discuss topics based on sustainable development.

Full overview of the Floriade Dialogue sessions 2009-2012

Previous sessions:

Floriade Dialogue #1: Visions on green-city structure

18 November 2009, Wageningen University Research Centre, Wageningen, The Netherlands

Floriade Dialogue #2: Urban ecological engineering and green production in populated urban areas

8 June 2010, World Expo, Shanghai, China

Floriade Dialogue #3: Water efficiency & innovation in green production and food production

28 October 2010, Wageningen University and Research Centre, Wageningen, The Netherlands

Floriade Dialogue #4: Efficiency and effectiveness in world distribution of healthy food

15 September 2011, Wageningen University Research Centre, Wageningen, The Netherlands

Floriade Dialogue #5: Influencing behaviour & change: Essentials for sustainable living

23 April, Floriade Dialogue Pavilion, Venlo, The Netherlands

Upcoming sessions at Floriade 2012:

Floriade Dialogue #6: Institutional transformation: transition for the highest value of resources. 10 May,

Floriade Dialogue Pavilion, Venlo, The Netherlands

Production that has a positive impact on resources could create significant opportunities for economies and businesses. This session will demonstrate the ways in which governments and businesses can build capacity and implement institutional transformation for resource productivity and improved industrial-waste cycles.

Floriade Dialogue #7: Improving productivity & efficiency in food production. 20 June, Floriade Dialogue Pavilion, Venlo, The Netherlands

Technological advances matter in terms of efficient food production. Which agreements are needed to improve production and optimise the agro supply chain? Which behavioural changes are necessary in road transport and air travel to improve planning and logistics, urban densification and a positive impact on environmental issues?

Floriade Dialogue #8: Food sufficiency & quality: A revolution of sustainable approaches. 5 July, Floriade Dialogue Pavilion, Venlo, The Netherlands

Technological advances in molecular biology and biotechnology have led to a burgeoning of specialisations and to new, often interdisciplinary, fields such as biotechnology, food science, health sciences, plant science and population dynamics, which are all interrelated when it comes to food sufficiency.

Floriade Dialogue #9: The role of the Self-Supporting City

The role of cities and the decisions governments make in urban settings are of increasing importance. The concept of the self-supporting city will be crucial in shaping attitudes towards the use of resources among the next billion urbanites and will potentially have a large impact on their resource footprints.

Floriade Dialogue Themes

- adequate and safe food production
- responsible use of natural resources
- balancing the built and natural environment
- using nature's potential to improve quality of life
- reliable access to sufficient high-quality food to lead active, healthy lives
- expanding economic growth and job creation through sustainable use of natural resources
- strengthening horticultural and agricultural value chain operation and collaboration
- generating (logistic) synergy and creating opportunities



New type of ventilator by Vostermans which draws in hot air and distributes it evenly.
Source: Vostermans Ventilation



Tomato plantation. *Source:* Grodan.

The High Tech Greenhouse 'thinks' like a plant

The High Tech Greenhouse 2020 gives you an insight into the greenhouse of the future. Eighteen Dutch and German companies join forces, combining their specialisms to increase production in horticulture while reducing the use of energy and water.

TOMAS GROOTVELD

There is no lack of technical innovations in horticulture. Specialist companies are focusing, often with excellent results, on issues such as improved plant nutrition, water usage, saving of energy, climate control and temperature regulation. This is truly necessary: according to the Food and Agriculture Organisation, there will be 9 billion people to feed by the year 2020. Most of them will be living in urban areas.

But how can you incorporate all these techniques under one roof? And how can you make sure that all those innovations cooperate and amplify each other? These are the questions to be answered by the High Tech Greenhouse (HTG). The HTG Consortium was founded in

2011. It consists of companies from different sectors in the region of Rhine Maas North, complemented by leading national knowledge institutions in this field (see box Floriade Innovation Cluster). Their goal is to improve production using intelligent techniques that make horticulture widely and sustainably applicable. The challenge is to feed the world's growing population while putting less stress on the environment: twice as much with twice as little.

"The Netherlands are leading the way in horticultural technology," says Freddy Dekkers, director of Water IQ, and one of the initiators of this project. "Countries such as China, Mexico, Turkey, and Russia

fly in our horticulturists to build greenhouses and to feed off their knowledge."

Smart greenhouses

The HTG Consortium is developing ways to integrate these techniques and methods intelligently. It is developing a system in which plants receive exactly what they need at exactly the right moment. This increases production and prevents energy and water from being wasted. The HTG enables monitoring and adjusting the growth of plants in greenhouses from a great distance, which in turn enables the development of horticulture in larger cities. In this way, the need for transport is greatly decreased and CO₂ emissions can be reduced.

Floriade Innovation Cluster

The Floriade Innovation Cluster collaborates with regional companies and leading knowledge institutes in the field of horticulture on developing and integrating individual innovations in a new production concept called the High Tech Greenhouse (HTG) 2020. The techniques are being tested and validated in a full-scale experiment in greenhouses near Sunny Tom Tomatoes in Venlo (Netherlands) and Georg Hanka Gartenbau in Kempen (Germany).

The challenge is to feed the world's growing population while putting less stress on the environment: twice as much with twice as little.

Efficient use of space and restricting transport mileage of fresh produce are not the only ways to ensure a sustainable food supply. Sufficient clean water, or the lack of it, is an endless matter of concern for farmers. Partly owing to climate change, periods of drought or heavy rains can become more frequent. A greenhouse provides a solution to this by bringing water to the plants in a controlled manner and by re-using excess water.

It is currently possible to re-use water several times to irrigate plants in the greenhouse. Freddy Dekkers and his company Water IQ are working on a model in which water can be re-used endlessly. Water IQ specialises in making filters for the food and beverage and the horticultural industries. It was one of the first companies to join the HTG project. "Great amounts of water are wasted in the current process. There is a system within reach in which filters can take out all pollution from the water meaning no water is wasted at all. Furthermore, this prevents fertilisers from spreading into the environment." Modern filters also make it possible to extract substances from the water that decelerate the growth of plant roots. This can help increase the productivity of the plant. The HTG contains innovations for every aspect influencing the growth process of the plant. Smart ventilators provide better climate control in the greenhouse. A new system for temperature and humidity control in the greenhouse uses less energy than conventional systems. This system also helps to reduce moulds and diseases.



New hygrometer by Grodan. Two pins with a sensor penetrate into a mat in which the plant is rooted. The sensor measures humidity and nutrients in the mat.

Source: Grodan

The HTG really mollycoddles its plants. "The greenhouse we are trying to create can almost think for itself," says Dekkers. "We are trying to combine all available knowledge and make it easy to control."

Role of the grower?

One of the most sensational innovations in the HTG is the GPS-guided quadcopter. It can measure each plant's growth, temperature and humidity. These data are directly sent to a computer. Together with other integrated systems, it can then take measurements concerning water, nutrition and temperature. The aim is to fly this device throughout the greenhouse without a horticulturist having to control it manually.

Less exciting but at least as effective is the use of double glazing in the HTG. Conventional greenhouses use single glazing, which is quite poor at insulating. The risk of using double glazing, however, is that the greenhouse can become too warm and moist. The new system of climate and humidity control can solve this problem. Integrating all these innovations into a properly working complex is called system integration.

All this leads to the following question: will there still be a role for the horticulturist in the greenhouse of the future? "What we are doing with these new techniques is automating the eye of the master," says Dekkers. We combine all knowledge and experience in techniques that accurately monitor the condition of the plants, 24 hours a day, 7 days a week, from up close



A water filter by Water IQ, used by industrial breweries, is adjusted for greenhouse horticulture.

Source: Water IQ

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Industrial greenhouse
Source: Ove Topfer

“These new techniques automate the eye of the master.”

or from a distance. This is impossible for a horticulturist to do. With these new techniques we can monitor plants from a distance and take the right measures when needed.”

But how do you convince a conventional horticulturist to switch to a decentralised method of horticulture? “The main argument is that there will be a decrease in the use of raw materials and an increase in output,” says Freddy Dekkers. “And current horticulture is pretty high-tech. Especially important is the integration of systems. This means growers have to work with computer technology even more. The challenge for technicians is to make innovations interact mutually, make them simple to apply and easy to operate.”

Obviously investments are needed in order to build new greenhouses with double glazing and to establish new water purification systems. The result, however, is a win-win situation. The output is greater because of an increase in efficiency and water is used optimally, with none wasted. The use of fossil fuels is cut by 30%, which saves the horticulturist a substantial amount of money.

A concept version of the HTG will be built in Limburg, near the Floriade grounds. A second HTG will be constructed in the German city of Kempen. The project will continue until 2014 to ensure enough time to measure and analyse results. Visitors to the Floriade can take a virtual look inside the HTG, the greenhouse of the future. ●

Project partners

Region Venlo Floriade 2012 BV *Lead partner*

Companies

ISIS-IC GmbH *Sensor development*

Elektro Limburg BV *Installation techniques*

Grodan (Rockwool Benelux Holding BV)

Substrates and irrigation

Hoogendoorn Automatisering BV

Automation and control

Vostermans Ventilation BV *Ventilation*

Pentair Haffmans BV *CO₂ from biogas*

Intelli-labs Deutschland Ltd. *Gas sensors*

Patron AEM BV *Climate control*

Water IQ BV *Water treatment and irrigation*

Phenospex GmbH *Growth scan sensors*

Doppelbauer Anlagentechnik *Heating systems*

Knowledge institutes

Hochschule Rhein-Waal *Remote control*

development and biomass development

by light

Wageningen University & Researchcentre

Growth modelling

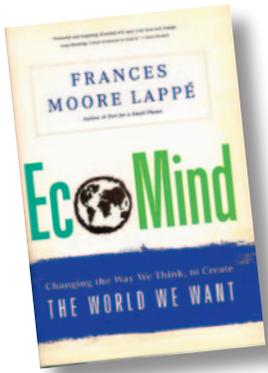
Hochschule Niederrhein *CFD modelling and*

flying sensor platform navigation

TNO *System integration applied research*

Forschungszentrum Jülich GmbH

Plan-oriented control modelling



EcoMind: Changing the Way We Think, to Create the World We Want

Frances Moore Lappé was keynote speaker at the fifth edition of Floriade Dialogue. In her books and publications she champions the power of people to take action through their own behaviour to balance the food chain.

MAARTJE SMEETS

After a conference on global environmental problems, Frances Moore Lappé realised that alarmists were missing the mark: “Arriving home after the conference, I was deeply troubled and asked myself: ‘Are we environmentalists actually defeating our own ends? Just when the magnitude of our environmental crises is becoming clearer by the day, are we pushing people to despair?’”

The uneasy feeling stayed with her and resulted in the writing of *EcoMind*, the author and activist’s eighteenth book. Nowadays, much is known about what goes wrong with our planet owing to human action. The problems seem so overwhelming that they paralyse us. What environmentalists should do, instead of hammering on about the extent of the problems, is convince people of their ability to contribute to change. “Central to our ability to solve a problem is how we perceive the challenge,” says Moore Lappé. “We have to start asking different questions to get different answers.”

The common thread throughout the work of Moore Lappé is the food issue. She caused a stir with her first book *Diet for a Small Planet* (1971), which sold 3 million copies. It is now seen as a blueprint for eating with a small carbon footprint, though it was published long before the term was coined. “The food issue is being approached from the perspective of scarcity: ‘There are too many mouths to feed and

crop yields are insufficient.’ But the fact is that never before have we produced as much food as today, and yet we are stuck within the ‘scarcity-diagnosis.’” The key question we should be asking ourselves is how humans can obtain a broader sense of responsibility and self-confidence. Agriculture should give farmers more empowerment through a long-term income. It is not easy to shift to a more positive perspective on a complex international system dominated by governments, mega food companies and existing rules and laws. “Yet, also, that international system is what we make of it”, argues Moore Lappé. “The Monsanto and other large food companies of this world are so powerful because we give them that power. They arose from a belief system that gene technology and chemicals are necessary to produce the amounts of food required to feed the world population. We ourselves have to come up with alternatives if we want our food to be produced differently. Once we make that shift, there will be amazing breakthroughs.”

Agricultural revolution

That this is in fact possible becomes apparent through an example from the region of Punjab, India, as described by Moore Lappé in *EcoMind*. India was one of the early adopters of industrial agriculture. The country used so many pesticides and other chemicals that the costs for these made up one third of the average farmer’s income. In addition, the population became ill



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Frances Moore Lappé

Frances Moore Lappé is the author of eighteen books including the best-seller *Diet for a Small Planet*. She is co-founder of the Institute for Food and Development Policy (Food First). She founded Small Planet Institute and Small Planet Fund, a collaborative network to bring democracy to life. In 2008 she received the James Beard Foundation ‘Humanitarian of the Year’ Award for her lifelong impact on the way people all over the world think about food, nutrition, and agriculture.

from the chemicals used. Moore Lappé notes, “People started to turn against these practices and demanded a different way of working. The high numbers of diseased and the falling income of the farmers convinced the government, who then set out



A mustard farm in India. The government reduces poverty by raising agricultural productivity in an internationally competitive, and diversified agricultural sector.

PHOTO: ANP RAMINDER PAL SINGH

to find alternative ways of farming that did not require the use of pesticides.” The Indian government commissioned to look for local, natural pesticides and fertilisers. The farmers learned to use their own compost. “The result was no loss of yield, but rather healthier, better yields.”

According to Moore Lappé, the strength of the project was that the farmers regained their dignity: “On a global scale people are moving from the country to the city, looking for work and an income. In Punjab the opposite is happening. People either want to stay in the country, or they return from the city because they can be independent again in earning a decent income. They are back in control of their own lives. Dignity is key here and that is exactly what is missing in the current game. It is something extremely powerful when people start to fight for their dignity. That is the force that can change the world into a better place.” In Western countries it seems that small-scale food production is only reserved for

the hip elite pursuing urban farming, guerrilla gardening and organic farming. But food provides precisely an opportunity to involve the disadvantaged in society, says Moore Lappé. “In Chicago an interesting experiment is taking place, in which former prisoners and homeless people are being educated to grow food, so food production is an ‘inclusion project’. People feel important again, involved, worthy. That is the power food has, and we can use it to our advantage to feed the growing world population.”

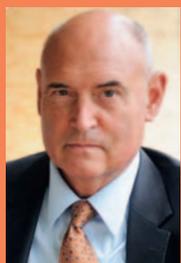
The power of small farmers and consumers, according to Moore Lappé, is greater than many people think. “We think we have detached ourselves from our food and its production, but food is in fact the most direct link between consumer and producer. Every man must eat, just as we need to breathe and sleep. This makes food – and even more so the way we eat – a powerful tool for permanent change.”●

The 7 thought traps that hold back change:

1. **Endless growth is destroying our beautiful planet, so we must shift to no-growth economies.**
2. **Because consumers always want more stuff, market demand and a growing population drive endless exploitation of the earth.**
3. **We’ve had it too good! We must power down and learn to live within earth’s limits.**
4. **Humans are greedy, selfish, competitive materialists. We must overcome these aspects of ourselves if we hope to survive.**
5. **To save our planet, we have to override humanity’s natural resistance to rules.**
6. **We’ve become so disconnected from nature that it’s pretty hopeless to think most people can become real environmentalists.**
7. **It’s too late! We’re at the point of no return. Democracy has failed and big corporations have too much power.**

Herman Wijffels Innovation Award

Exhibition at Floriade Dialogue Pavilion



Not only does the Floriade Dialogue Pavilion host the Dialogue meetings, workshops and debates, it also houses the exhibition of the Herman Wijffels Innovation Award. The award was instituted in 1999 and was designed to promote sustainable innovation and corporate social responsible entrepreneurship.



A fishtank on board

'For ages we've been looking for methods to reduce by-catch. As a fisherman I used to brood on this continually. For every kilo of eel we catch in the IJsselmeer, an additional 29 kilos of incidental catch end up in the nets. Suddenly I had a revelation: we shouldn't waste our time on reducing by-catch, we should make sure that all fish we bring on board leave the ship again alive and well. That's how we came up with the idea of a survival tank. This is another step towards our dream of a positive and sustainable image for the fishing sector.'

Patrick, Jack en Ger Schilder
VOF Schilder en Schilder VD-64
Winner 1st prize 2011



Sensitive ears

'The Agis CowManager SensOor monitors the vital signs of a cow, such as temperature, movement and sound, 24 hours a day, 7 days a week. The SensOor is placed in the cow's left ear. The system can detect diseases such as flatulence: udder, womb and foot infections: blue tongue and salmonella, all at an early stage. The cow then receives immediate treatment before any other animals are infected. This reduces the use of medicines such as antibiotics, so they don't enter the food chain.'

Gerard Griffioen, Agis Automatisering BV
www.agis.nl
Winner 1st prize 2008

The Agritron

The Agritron is a super microwave which can decontaminate the soil to make it suitable for agriculture and horticulture. The electromagnetic rays kill pathogens. The device reduces carbon emissions by up to 75% compared to traditional methods of decontamination through steaming of the soil. It is also less physically demanding to operate.

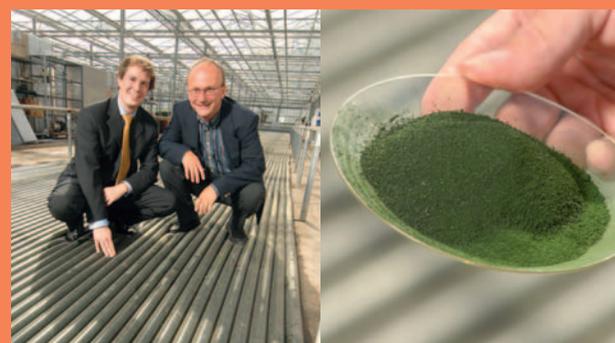
L. van der Hoek and A. Middelburg
www.koppertmachines.nl
Winner 1st prize 2006



Mechanical harvesting of the 'white gold'

'When spring comes, many people really look forward to eating asparagus again. The harvesting of the 'white gold' is traditionally done manually. It is hard labour, because it is done in a bent position. This is where the asparagus-harvesting machine takes over. It is driven across an asparagus furrow, and a sensor at the bottom detects an emerging asparagus tip, ready for harvesting. The asparagus is cut off and deposited in a water-filled container. Asparagus farming is one of the last branches of agriculture still to be automated. This machine makes it possible.'

Comé Ooms
www.zzcomet.com
Winner 1st prize 2010



Local plant packed with useful materials

'Duckweed is a fast-growing water plant that is quite common in the Netherlands. It is full of proteins comparable to those in soy, but its yield is ten times higher. Together with Innostart and Mesys, Inodia has developed a technology that enables proteins to be extracted from the duckweed while maintaining all their beneficial properties. These can be used in food, for example as a replacement for animal proteins, and in technical applications such as adhesives and coatings. Besides proteins, duckweed contains cellulose and colorant. The waste product is used by Inodia for biogas and minerals that can absorb the weed as fertiliser. This closes the cycle.'

Lourens Zwart, Hans Derksen and Cyp Wagenaar
www.inodia.nl
Finalists 2011



Founding ceremony of the agropark in Nellore, India.

Agroparks deal with scarcity

Water, energy, arable land and raw materials are scarce. The spatial clustering of different agricultural activities within agroparks enables us to tackle scarcity issues and contributes to reliable food-supply chains for fresh products. Researcher at Alterra, Peter Smeets, is involved in setting up agroparks worldwide.

PETER SMEETS

The increase in purchasing power among the urban middle classes has caused a revolution in food consumption, in terms of both quality and quantity. The flipside of this process is the marginalisation of rural areas due to depopulation, population ageing and brain drain. Still, these rural areas are largely responsible for the world's food production. A radical innovation of the agrofood system and an increase in sustainable agricultural productivity is necessary – not only to

feed the world but also to minimise the contribution of food production to climate change.

Climate problems

The advantages of large-scale agroparks are obvious: achieving a reduction in the use of water, energy and raw materials, as well as minimising waste, is easier when different forms of agriculture are integrated into one agropark. High-production, industrial agriculture can offer

an important contribution to the solution to current climate problems and related water problems (figure 1, page 18). Agroparks are spatial clusters of multiple food production chains in an industrial set-up, situated close to large cities. The basic principle of agroparks is to minimise the use of fossil fuels and to work with closed cycles: for example, the water cycle and the nutrient cycle. Waste cycles and by-products of one process are converted to be used as the input of another one. Rest

Agroparks

Agroparks are integrated systems of greenhouse agriculture and/or animal production of meat and dairy products combined with the industrial processing of agro products. Energy production, as well as waste and water management, are integrated within the business model. An agropark delivers products throughout the year as efficiently as possible, independent of season and soil.

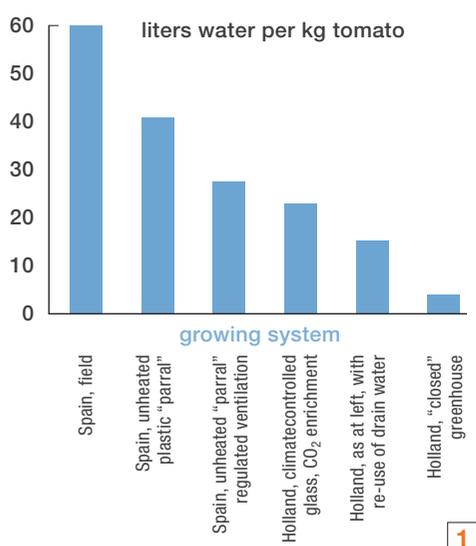


Figure 1. Water-use per kilogram of product is compared in different tomato-production systems, from traditional open-field systems to high-tech systems in closed greenhouses

product goes straight into the digester, to supply energy to the park. By integrating as many production processes as possible, there will be a decrease in transportation, and hence in the use of energy. Despite these benefits, there are many social, political and financial obstacles to overcome. Experience in recent years, however, offers useful lessons. The agropark concept is aimed at sustainable development. It evolves from a 'creative research-by-design' process (co-design), in which knowledge institutes, entrepreneurs, non-governmental and governmental organisations cooperate.

Co-design focuses on the 'hardware' of the agropark, such as buildings and machines, as well as on time-consuming 'software aspects', such as education, training and communication. The more complicated aspects, such as co-operation structures and business development, are also taken into account in the co-creation process.

Problems to overcome

Our co-design practice in recent years clearly shows that problems concerning business development and cooperation structures are the most complex to

solve. To establish an agropark, we have to convince entrepreneurs of the worth of different value chains in terms of collaborating in the industrial ecology of the park. They have to give up some of their independence in order to benefit from cost reductions. In Nellore, in India, we have learned how helpful the formation of joint ventures of Indian investors and international entrepreneurs is. (Example 1)

Another challenge is to stimulate small farmers to move away from existing subsidy schemes. How can they be convinced to change a lifelong learning attitude in



Figure 2: The founding ceremony of Agropark IFFCO Kesan Nellore on 21 March, 2008. The ceremony was attended by 5,000 farmers. The agropark provides new employment in modern food production and processing.



Figure 3: Agropark IFFCO Kesan Nellore. From bottom to top: residential areas, R&D and training facilities (left) greenhouses (right), processing and livestock production; reserve space and logistic facilities (top left)

Example 1

Agropark Nellore (figure 2 and 3) in India, covering 1,100 hectares, is designed to serve local as well as export markets. Figure 3 shows a 3D animation of the design. The agropark is an initiative of the Indian Farmers Fertilisers Cooperative, which had the land available in Andhra Pradesh. Its most critical success factor is the formation of joint ventures between Indian investors and international entrepreneurs. They add their operational knowledge to the project by supplying manpower such as technology assistants, trainers and professional coaches. At the same time, this joint venture has to cope with the stifling bureaucracy of the Indian government.



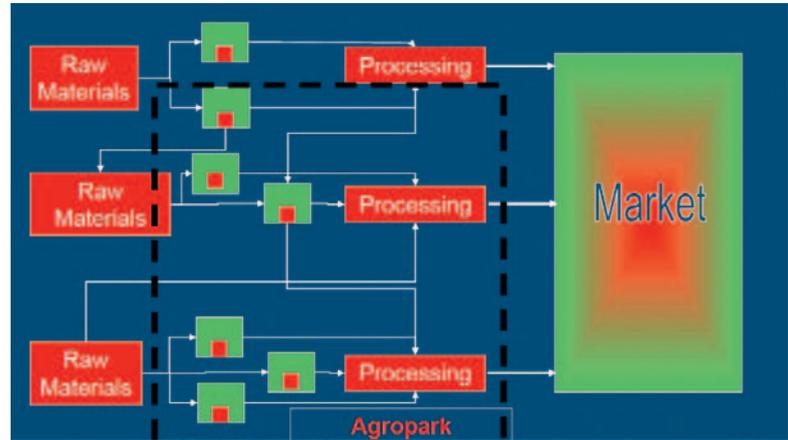
Figure 4: Artist's impression of Greenport Caofeidian in China, with residential areas, service areas and urban function areas in the middle surrounding a large water-storage lake. Greenhouses and closed fish production on the right, livestock production on the left and logistic functions top left and top middle.

Example 2

Figure 4 shows another example of a greenfield design: Agropark Greenport Caofeidian has been designed as part of the industrial and metropolitan development area in Tangshan City in China, 300 kilometres east of Beijing. The agropark is situated around a new eco-city and a water reservoir. Once implemented, approximately 10,000 employees, can live with their families in the eco-city situated at the heart of it. Greenport Caofeidian is an initiative of the Caofeidian District government, which assigned the whole new industrial area south of Tangshan City. The government is now looking for private parties worldwide who are willing to incorporate the design as a starting point for further development and implementation.

order to become preferred suppliers in a strongly integrated chain? In Nellore, the Indian Farmers Fertilisers Cooperative played an important role in keeping local farmers on board. Farmers were motivated by the prospect of new employment and better prices for their products. The opening ceremony of the MFC was attended by 5,000 farmers. Another big challenge is to determine how best to stimulate governments to allow experiments with innovative processes concerning energy production and waste and water management. These experiments are often not covered by existing legislation, precisely because they are experimental. Example 2 shows how the Chinese government has created possibilities for private investors to invest in an agropark. We also have to find ways in which to

convince environmental pressure groups that industrial high-production agriculture can actually help solve climate-change problems to an even greater extent than the idealised conceptions of agricultural models of days gone by – models that never really existed in the first place. Solutions to this problem became clear during the development of the New Mixed Company, an agropark that is planned near the Floriade site in Venlo. (Example 3). At the same time, the software issue of training and education is, in many cases, the most critical success factor as far as time is concerned. It is possible to speed up the implementation of hardware structures, such as a greenhouse, by adding more resources. This is, however, not the case in the education of the workforce who operates these structures.



Concept Agropark
Source WUR

Example 3

The New Mixed Company is part of the Greenport Venlo. This agropark has a focus on high-production industrial livestock. Its planning process has taken over eight years and has been dominated by heated discussions about the acceptability of industrial livestock production. The Floriade area can also be regarded as part of Greenport Venlo, as can the nearby greenhouse concentration areas and the consolidation centre Freshpark Venlo. Implementation of the New Mixed Company is expected to start in 2013.

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Not a blueprint

Because each agropark design has to integrate these highly specific elements, it can never be an exact copy of an existing general model. In recent years, a number of agropark co-designs have been developed in growth economies such as China, India, Mexico, South Africa and South Korea. These designs often have the characteristics of jump innovations in a greenfield situation. This is contrary to the situation in the Netherlands, where the implementation of these systems focuses on innovation and modernisation of existing industrialised systems. Each agropark design is tailor-made and needs to address the physical, social and cultural characteristics of the metropolitan area in which it is situated. ●



PHOTO MVR

How to feed Shanghai?

Shanghai is a hungry city. Hungry, because it has many mouths to feed, but also because the city is usurping the surrounding land. As is the case in many other megacities, a large part of agro-food production takes place in and around the city. Shanghai has therefore opted for an accelerated reform of food production, from small-scale agriculture to modern agroparks.

MARTIJN VAN RIJNSOEVER

The Chinese consider agroparks to be the solution to feed 'the hungry city'. An agropark is a cluster comprising agriculture, livestock farming, and sometimes even fisheries, all of which operate within one system. (Page 17. *Agroparks deal with scarcity*). Madeleine van Mansfeld from Wageningen University & Research Centre is involved in the development of Greenport Shanghai. "Because of our involvement in Greenport Shanghai,

we are being approached to assist in the establishment of agroparks elsewhere in the world. We are also involved in projects in other parts of China, and in India and Mexico. It is entirely demand-driven." The scale of these projects is crucial, partly for reasons of efficiency, but mainly also because large investments are needed. Agroparks are only economically feasible when run on a sufficiently large scale.



A typical wet market at Julu Road Shanghai

One thousand truckfuls of vegetables needed daily to feed Shanghai



PHOTO SUNQUAIO AGROPARK

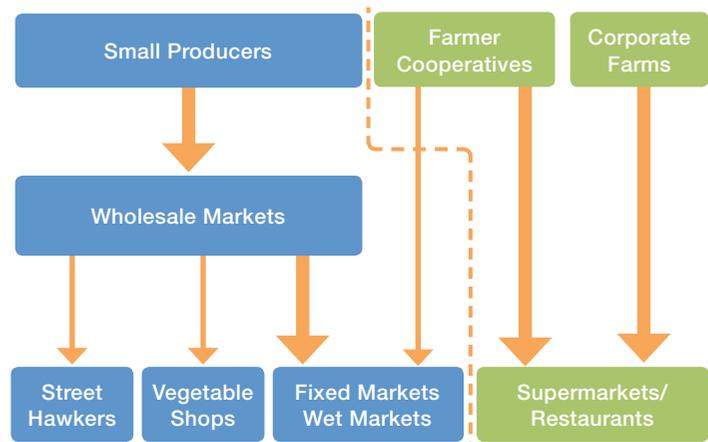
A greenhouse at Sunquaio Agropark

A glimpse at Shanghai, the fastest growing city in the world

According to the Brookings Institution, Shanghai is currently the fastest growing city in the world. The 2010 census put the total population numbers at 23 million: a country in itself. One fifth of Chinese industrial production is situated in Shanghai's surrounding areas. Both the city and its industry are rapidly usurping the surrounding space. What used to be agricultural land ten years ago has now become huge expansion areas and industrial zones.



Nine newly planned cities in the Shanghai region.

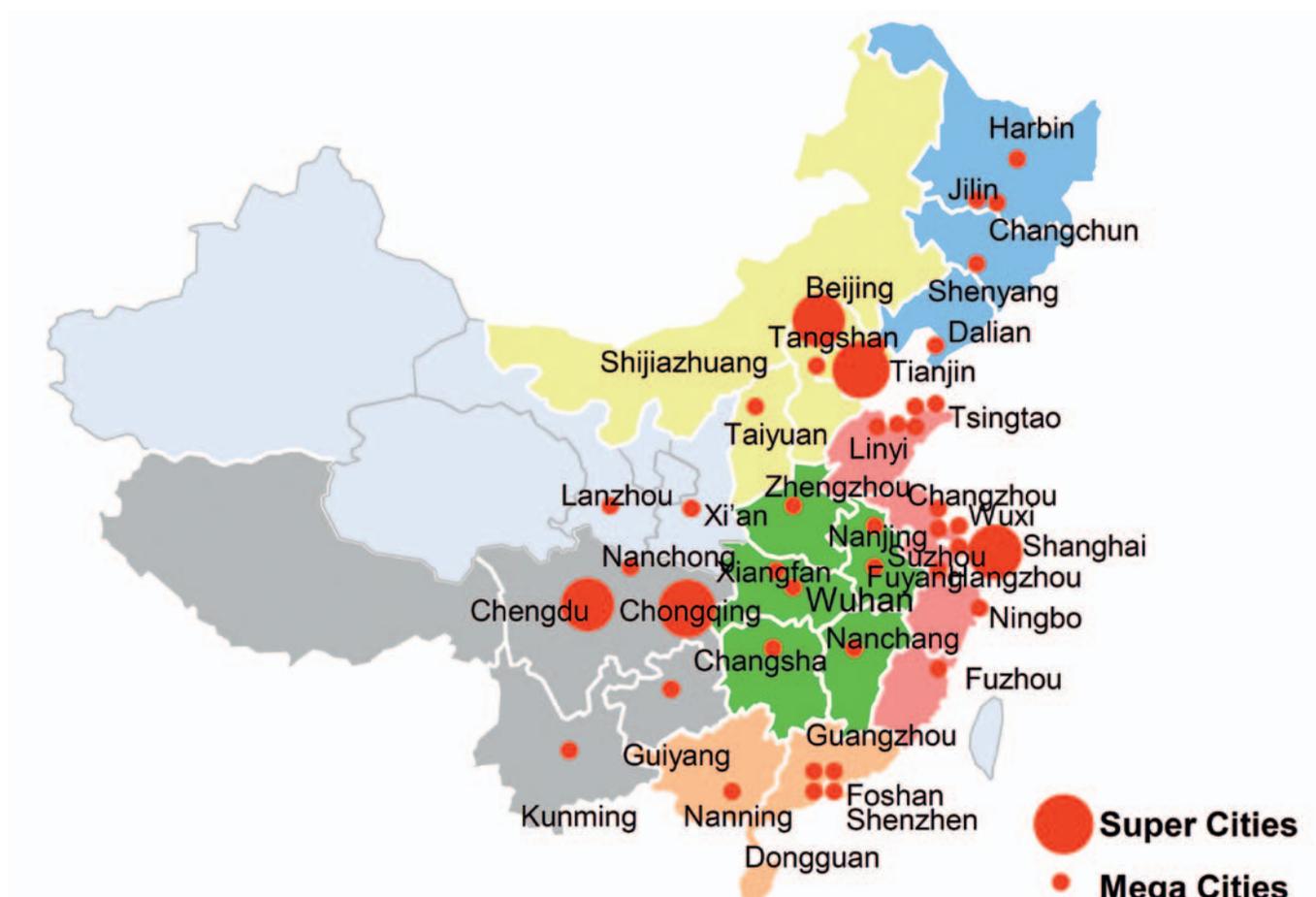


Shanghai's vegetable supply chain

It is currently estimated that 80% of vegetables come from small farmers and are distributed via ten vegetable wholesalers in Shanghai to the wet markets. On the right we see the development of large integrated chains, in which supermarkets buy directly from large producers. A government company such as Bright Food Group even partially manages a farm-to-table chain with large agriculture companies, processing industry and its own chain of supermarkets. Within these chains, it is easier to maintain food quality control. Currently, around 20% of food production and marketing takes place within this chain.

Source: Simplified diagram from Qian Forrest ZHANG, 2011

The available water is polluted from intensive use of agriculture, industry and population.



Source: Frost & Sullivan

Meanwhile, food production mainly still takes place in and around the city. Each year, Shanghai consumes about 5.6 million tonnes of vegetables, which are largely produced in the direct vicinity of the city. This equates to around one thousand truckfuls of vegetables needed daily to feed Shanghai. Efficiency, safety and ecological foot printing of food distribution clearly need to be improved in a sustainable way. This is also particularly the case for the position of producers within the chain.

According to Nick Hong, senior agrifood officer at the Dutch consulate in Shanghai, there is an emerging quality-control market. "At the moment, most vegetables still come from small farmers and are distributed via fifteen vegetable wholesalers in Shanghai to the 5,000 wet markets. However, over the last years there has been an increase in large-scale integrated chains, in which large supermarkets buy directly from large producers. A government company such as Bright Food Group even partially manages a farm-to-table chain with large agriculture companies, the processing industry and its own chain of supermarkets." It is much easier to maintain quality control within these

The 12th five-year plan (2010–2015)

The Shanghai government's 12th five-year plan includes objectives related to the aforementioned analysis. Shanghai still needs to make the transfer to large-scale agriculture. This is mainly because until now it was able to employ a seemingly endless amount of cheap workers. But production costs are rising, less land is available, demands are going up and the workers also want their share of the new wealth. There remain few other options for the city than to become more efficient. On top of that comes the population's demand for reliable food – all the more reason for the government to quickly develop a new agricultural system.

Objectives

- 90% recycling of agricultural waste
- 80% composition of leading agricultural enterprises and co-operations
- 60% rise in farmers' income
- 90% coverage of the safety and traceability system for entire food production
- integration of agriculture, production and trade (supply-chain integration)
- vegetable price insurance system, for security during reforms

Greenport Shanghai

Greenport Shanghai was a master plan toward an entirely ecological agrocity on Chongming Island, in the vicinity of Shanghai. As master plans go, Greenport Shanghai was truly a work of art. It skillfully combined the most advanced knowledge in the fields of spatial planning, networks, ecological agriculture, integrated water management and process development. Scenery and panoramas reminiscent of Jules Verne completed the vision.



Unfortunately, Greenport Shanghai never got beyond the planning stage. The ambitious and visionary plan, drawn up in 2007, comes across as somewhat naive when read in 2012. At the same time, it would be too easy

to make this judgement. Where better in the world than in China – and even more so in Shanghai just before the World Expo and the worldwide recession – could an experiment of this magnitude have taken shape?

Besides, it certainly wasn't all for nothing. The concepts and knowledge gained from the Greenport Shanghai master plan are now being applied in different parts of the world.

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China's urbanisation levels have recently exceeded 50%

chains of bigger players. Hong estimates that currently 20% of food production takes place in (green) quality-control chains. And as the City of Shanghai's last five-year plan shows, it is these kind of large companies and co-operations that will shape the future of food production in Shanghai (see 12th five-year plan Shanghai (2010-2015)).

Megacities all over the world are now rapidly expanding. They are often situated in delta areas where traditionally fertile soils are combined with a logistically practical location. What people often do not realise is that a large part of food production takes place in and around the city itself. That's how it used to be, and that's how it still is now. Because of the cities' rapid expansion in size, population and prosperity, it is becoming increasingly difficult to feed their populations. In China, traditionally an agricultural economy, urbanisation levels have recently exceeded 50%.

Shanghai faces scarcity

Shanghai, like many delta metropolises, faces scarcity. Despite the fact that the Yangtze River supplies a lot of water, the available water is polluted from intensive use of agriculture, industry and population. Fertile soils are sacrificed for urban development and economic activities that have a higher added value than agriculture. Although food production is consuming large areas, it only adds a few percent to the economy. Salaries in agriculture are going up, with an increase of 13% last year. The price of minerals such as phosphates, needed for a higher yield, is becoming higher and higher. Van Mansfeld: "China is a fast-paced and commercially oriented society with plenty of business

opportunities, including in the food-supply sector. With the Chinese entrepreneurial spirit, this ensures the right conditions to earn a lot of money quickly. The costs to society have been at the lower end of the scale for a very long time."

The abuse of finite resources such as soil and water, and also humans, is not taken into account in China's attitude to food production. According to Van Mansfeld, only the consumers' recent demands for sustainable and safe food production can reverse this. If these are taken into account, a more sustainable development of the food-supply chain in China, with a more careful use of soil, water, minerals and human resources, could evolve. "This, however, requires the Chinese government to make tough choices with far-reaching consequences. It has to create the conditions needed to restore damaged resources. And on a social level, the government can build a more sustainable food-production chain by creating a more balanced distribution of power between the production, processing, wholesale and retail industries."

Growing awareness

The quality of food and food safety have become more important to the Chinese. A small avant-garde group is already focusing on ecological agricultural products, and a recent government survey showed that 90% of respondents expect the government to improve food quality control. Shanghai's government rose to the challenge in its 12th five-year plan. New ways of using water, soil, space and human capital should help to feed the Chinese cities now and in the future. ●

The chain starts at the farm



PHOTOS: TJEERD FONK

Discussions on the production of adequate food supplies soon touch on topics such as scarcity of water, land or resources, or on climate issues, yet the crucial factor often goes unmentioned: the farmer. It is time for a revaluation of the farmer and his or her indispensable role in food production. Executive Board member of Rabobank and farmer's son, Berry Marttin, discusses the key role farmers have to play.

MAARTJE SMEETS

“We have entered an ‘era of scarcity,’” states Rabobank in *Rethinking the Food & Agricultural Supply Chain* (2011). World population numbers are rising, people’s eating habits are changing, and climate problems are affecting the available agricultural land and water. Current production levels are not sufficient to feed everyone in the future.

You say that farmers are the key to solving this immense challenge. Do you feel that this is fair on the farmers?

“The problem is precisely that farmers are now overlooked. Shortage of land and water are not the biggest challenges, although it often seems that way. With improvements in technology and efficiency, major steps have been taken in those areas, and there is still much to gain. However, the actual scarcity is the farmer. There are not enough farmers in the world who are young and willing to embrace innovation in order to change existing practices.

To innovate, farmers need access to education, technology, financing and information. We as a society have to invest in that. Events such as Floriade have an important role in the dissemination of the latest knowledge, through much-needed international dialogue. For example, Rabobank has invited 50 farmers from 18 countries – from Brazilian commercial farmers to African farmers who have yet to commercialise – to come to Venlo. Together with these farmers, experts and academics, Rabobank wants to have a dialogue about, for example, sustainability. The 50 farmers are currently staying with Dutch farmers. This kind of exchange inspires them to think about topics they will not likely come across in their own environment. They can learn from each other, take the experience home and talk about it with their colleagues.”

Food-supply chains are increasingly complex structures. Today, these are industries in which mega companies seem to rule, in



In Tanzania Rabobank helps local coffee farmers to improve their yield and income.

often opaque ways. Is it not too simplistic to pinpoint farmers, within that complex system, as the solution to our food problems?

“Precisely because of this complexity, we forget who is at the source of our food: farmers. In the United States, there is only 1 farmer to 125 inhabitants, which is less than 1%. People do not realise how much we depend on farmers, despite the fact that they are at the very beginning of the food-supply chain. It is the farmer who produces the food, not the chain.

In recent years, there has been a growing trend for large retailers and food-processing companies to focus more on the farmer’s role again. They pay attention to the origin of products and use that in their communication to the consumer. In this way, the entire chain is involved in a revaluation of the farmer. It gives farmers the necessary space, information and awareness to innovate and to become more entrepreneurial.

There is a growing demand for food, but there are fewer farmers. How can we maintain the balance between producers and consumers?

In the United States, there are 350,000 farmers aged 75 and over, and 55,000 farmers younger than 25. That is the scarcity element I am talking about. Farming needs to become attractive again, ‘but farming companies get very low returns.’

Only in recent years, prices have become high and volatile due to scarcity. Brazilian and American farmers have never before received higher value for their products, which indicates that the appreciation for their profession is changing slowly but surely. It is a gradual process. Farmers do not always receive a fair price for their products, but that situation is slowly shifting.

Does the farmers’ position simply depend on the goodwill of the rest of the chain, or

“The scarcity elements are not water or land; the world is lacking innovative farmers.”

can they strengthen their position on their own?

Rabobank was first established in order to provide credits to farmers, enabling them to purchase the machinery necessary to increase their production. That is in fact what we still do. In countries such as Tanzania and Rwanda, we provide access to financial services where this is fragmented, through a minority stake in rurally orientated partner banks. We are currently improving access to credit, in order to stimulate innovation and entrepreneurship.



“It is the farmer who produces the food. Not the chain.”

Farmers need to evolve into rural entrepreneurs. The goodwill towards and knowledge about more sustainable methods is there, but the necessary investment and credit to facilitate these innovations are lacking. With laws and regulations, governments can create preconditions for excellent farming.

Isn't it asking too much of farmers to evolve into rural entrepreneurs and to meet the sustainability demands of the chain and of consumers?

This indeed requires extra effort and investment from farmers. “Being a farmer is a lifestyle in itself: it is a fairly isolated

life, demanding a lot of hard work. On top of that, you also need to be innovative and sustainable. Food wastage needs to be halved and productivity has to go up. Businesses, governments and banks can create the conditions to facilitate these extra efforts and create an enabling environment for the rise of the rural entrepreneur. For example, Rabobank distributes a sustainability checklist in Brazil. Farmers who meet the criteria can receive a discount on our credit products. These kinds of things can offer a helping hand to farmers and stimulate them to innovate.”

“We have to be careful not to discourage farmers from becoming more sustainable by pointing a didactic finger. At the same time, there is not going to be any increase in land or water, so we have to innovate in order to raise production. And this is possible. In the Netherlands, for example, production is 8 tonnes per acre compared to 3 tonnes in Brazil. The problem is not scarcity, but lack of innovation.” ●



Berry Marttin
Rabobank group.
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Berry Marttin

Berry Marttin (1965) is the son of Dutch emigrants, and was born and raised in Brazil. As an Executive Board member of Rabobank, he is responsible for the International Rural and Retail division of Rabobank International. He joined Rabobank in 1990, after completing a degree in business administration in Brazil. His career at Rabobank International has given him extensive experience as an international banker, in both the wholesale and retail banking business. His career has taken him to managerial positions in Curacao, Hong Kong and Indonesia and he served as Deputy General Manager of Rural Banking in Australia and New Zealand.

opinion



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Nitrogen: Too much of a good thing

In 1898 Sir William Crookes called upon England and all other civilised nations to help solve the food-security problem. The production of food depended too much on natural resources, such as guano, which were rapidly depleting. Now, more than 100 years later, we again face the challenge of food security for the fast-growing population. Now, though, we talk about different natural resources, such as fertile land, water and phosphorus. We have solved Crookes' nitrogen shortage by establishing a large chemical industry. But is this a good thing?

The use of fertilisers ensures sufficient food to feed half of the world's population. Furthermore, the meat industry has increased tremendously, which is also partly due to the availability of fertilisers. However, there are appreciable leakages of nitrogen into the environment owing to agricultural practices. An over-abundance of nutrients in the environment leads to acidification of soil and water. Nitrogen emissions and deposition cause poor air quality and have impact on climate stability through N₂O emissions. Nitrogen pollution has become one of the most important global environmental issues, affecting food security negatively because of its effects on ecosystems.

Nitrogen emissions need to be reduced in order to meet the needs of the growing population with its changing diets while improving the environment. We are gradually realising that we need to ensure that our food production, transport, retail models, food preparation and waste management become more sustainable. Although each link in the food-supply chain is currently attempting to make its own contribution more sustainable, the overall result will not necessarily ensure a sustainable chain. Footprint modelling assesses the whole

chain of nitrogen emissions for consumer products. This might serve as a starting point for an integral approach to sustainable agriculture and healthy nutrition. (See www.N-print.org to calculate your nitrogen footprint).

According to the Dutch Council for Integral Sustainable Agriculture and Nutrition, food production has, to a large extent, been removed from its ecological and social context. From an ecological point of view, agriculture has been reduced to systems with disrupted cycles and low biodiversity, in which little self-regulation takes place. Such agricultural systems are highly dependent on the external inputs of fertilisers, pesticides and veterinary medicines. The distance between producers and consumers of food has increased, as has the number of links in the food-production chain. Much of our food is processed, with the result that it has become anonymous to the consumer. As a result, consumers feel little responsibility for production methods and the agro-ecosystem.

Food must once again be reconnected with visible ties to its ecological and social context. Food production must be removed from its situation of anonymity, and once again acquire a face and an identity. Such a development is often simpler if food originates from a consumer's own region. The linear food-supply chain must give way to a circular food cycle. A cycle enables consumer and producer to re-establish some form of communication with one another, and a sense of responsibility towards one another. This could result in increased ecological resilience and improved food quality, as well as a strengthened food culture. Eventually, this will also solve most of our nitrogen problems.

“Nitrogen pollution has become one of the most important global environmental issues”

UNITED NATIONS YEAR OF COOPERATIVES

Jobs, food and energy thanks to jatrophanuts

Is it possible to create jobs and economic growth through sustainable use of natural resources? That is the central question at the sixth edition of Floriade Dialogue. The project Mali Biocarburant is an example of new ways to produce energy with a positive impact on resources, creating significant new opportunities for economies and businesses.

MAARTJE SMEETS

The sceptics had some tough questions about agricultural economist Hugo Verkuil's renewable energy project Mali Biocarburant. His idea was to build a new factory in Mali, West Africa, for the production of biodiesel based on jatropha nuts. "Surely this is just another project that only costs money?" asked potential investors. Human-rights organisations were concerned that local farmers would have to make way for the production of jatropha nuts; food experts feared the sacrifice of agricultural land for energy crops; and agricultural experts warned about a monoculture that would demand water and nutrients from the rest of the environment.

Food versus energy

Much of the criticism levelled at the cultivation of energy crops relates to the sacrifice of agricultural land originally used to grow food. Energy companies often buy thousands of acres of agricultural land, and local farmers have to make way for monocultures such as sugar cane and

palm trees for the production of palm oil. This is not the case with the Mali Biocarburant project. Verkuil explains: "We help the farmers to integrate some trees with the food crops on their own land, aiming to stimulate food production. It may sound contradictory, because you cannot grow corn where a jatropha tree is standing. However, research at the universities of Wageningen and Burkina Faso has shown that jatropha trees in fact have a positive effect on these crops. "The leaves from the trees absorb the heavy rainfall, which prevents erosion and allows water to flow gradually into the soil. Moreover, the leaves on the ground form a layer of biomass, enriching the soil with valuable minerals." According to the researchers, this leads to an increase of 40 to 50% crop yield within four to five years. Mali Biocarburant is based on a model in which jatropha trees cover 20 to 30% percent of the land; the other 70% remains available for food crops such as corn, sorghum, onions, tomatoes, red chilli peppers and okra.

Profitability

In Mali, and meanwhile also in Burkina Faso, approximately 8,000 small-scale farmers are working in cooperation with Mali Biocarburant. The company buys all the yield of the trees, earning each farmer an additional annual income of around EUR 150. Therein lies the danger of farmers planting their entire land full of trees because of the secure source of income. "I expect the farmers to keep producing multiple crops," says Verkuil. Onions, for example, give a higher turnover than jatropha seeds. Moreover, the farmers are also entrepreneurs who need to spread risk." The farmers don't just profit from the guaranteed purchase alone, however. "We want the farmers to feel connected to the company," says Verkuil. "Therefore we united the participating farmers in a union



Jatropha

The seeds of the jatropha tree contain oils, 27 to 40% of which can be processed into biofuel. The trees can grow from five to eight metres high (16 to 26 feet) and grow well on poor soils. Press cake (seedcake) is left after the oils are pressed from the seeds. It contains a lot of nutrients and can therefore be composted and used as a fertiliser (green manure). Arid soils can become fertile again after six to nine years of fertilisation. Per acre, approximately 1,000 jatropha trees can be planted, and this should yield around 1,500 kilograms of seeds per year – which should in turn yield around 450 to 500 litres of oil annually.



2



3



4

How East African farmers benefit from the cooperative approach

Mali Biocarburant SA cooperates with several farmer unions and established cooperatives. It enables thousands of farmers in West Africa to improve their living standards in an environmentally and economically sustainable way.

1. Direct employment for more than 150 people and indirect employment for more than 8,000 farmers, impacting more than 80,000 people.
2. A state-of-the-art biodiesel processing unit in Koulikoro, Mali and Burkina Faso.
3. Oil extraction from jatropha nuts near the harvesting site and transportation by truck to the factory for refining, factory work and end-product distribution.
4. Transformation of the press cake into biogas, which provides electricity locally, and sale of 'liquid fertiliser' - a by-product from digestion of jatropha press cake - to farmers who use it as an organic fertiliser.
5. Production of soap from glycerin, another by-product from biodiesel production, by a local women's cooperative.
6. The development of small independent jatropha tree nurseries, where plants are sold to farmers for intercropping or replanting jatropha hedges.

Hugo Verkuijl on the recent crisis in Mali

"Because of the coup there is a shortage of food and income for many people in the countryside. By buying jatropha nut, we can make a direct contribution to the farmers' earnings. Our campaign to buy jatropha nut however, has had a slow start due to the crisis. The promise of receiving a trade credit from the Bank of Africa has thereby become uncertain. However, important partners of Mali Biocarburant kept supporting our business. It seems that our company has survived the crisis without too much damage."

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1. Corn plants between jatropha trees
2. Independent jatropha tree nursery
3. Jatropha nuts
4. Oil extraction from jatropha nuts

which is a 20% shareholder of the production company of biodiesel. By making the farmers co-owners, they have an interest in a growing, profitable company.”

Climate

Mali Biocarburant received approval from the CarbonFix organisation for its methods, as small-scale farmers contribute to CO₂ fixation by planting jatropha trees. The farmers receive *carbon credits* which they can sell on. Per acre, this amounts to another EUR 225 of extra annual income for each farmer. The planting of trees was financed for quite some time by car manufacturer Kia Europe in cooperation with Trees for All. It enabled the car manufacturer to buy off its excess CO₂ emissions and shape its sustainability policy. “On top of that,” says Verkuijl, “biodiesel results in a 73% reduction of CO₂ emissions compared to normal fuel. Mali Biocarburant sells biodiesel at a lower price than imported fossil fuel, which is also benefiting consumers. We use the byproduct of biogas to generate electricity. The factory is also hooked up to a transformer supplying electricity to the village’s energy network. What remains at the final stage of the production of biofuel is a nutrient-rich fertiliser that the farmers use to fertilise their food crops.”

Finance model

Mali Biocarburant was set up with the help of private and public investors. “The money was largely used to invest in building the capacity of the locals. The factory is now fully run by Malians,” explains Verkuijl. It no longer depends on additional financial support. The biodiesel is sold to Grand Moulins du Mali and to a cotton factory, which uses it to power its generators. Small taxis are also running on biodiesel. “We have been able to fully live up to the ideal of local production, local processing and local consumption,” Verkuijl says. The company duplicated its methods to expand in Burkina Faso, using funds from a Private Sector Investment programme (PSI). At the moment, Mali Biocarburant is the first and only private company to receive a grant from the International Fund for Agricultural Development (IFAD). It aims at using the same approach to expand in Senegal, Ivory Coast and Guinea, through separate foundations. This project began in March 2012. ●

5. Jatropha nuts
6. Oil extraction from jatropha nuts near the harvesting site.
7. Local small-scale factory where oil is extracted before it is transported.



2012 United Nations International Year of Cooperatives

The United Nations General Assembly has declared 2012 as the International Year of Cooperatives. With the theme of ‘Cooperative Enterprises Build a Better World’, the UN-Year seeks to encourage the growth and establishment of cooperatives all over the world. It also encourages individuals, communities and governments to recognise the agency of cooperatives in helping to achieve internationally agreed upon development goals, such as the Millennium Development Goals.

Cooperatives are business enterprises owned and controlled by the very members that they serve. Their member-driven nature is one of the most clearly differentiating factors of cooperative enterprises. This means that decisions made in cooperatives are balanced by the pursuit of profit, and the needs and interests of members and their communities.

Restoring the balance between city and country

The word ‘healing’ is central to Amsterdam’s green vision. Plans to bring Floriade 2022 to the Amsterdam South-East district supports this vision. It would be the showcase of a restored relationship between city and country, in which both sides benefit. Zef Hemel of the City of Amsterdam is one of the masterminds of this plan.

SERVY BRULS

Less than hundred years ago, Amsterdam was the largest agricultural municipality in the Netherlands. The surrounding area largely provided for the city’s food requirements. Until right after the Second World War, Amsterdam was almost fully self-sufficient in terms of food supplies. Right now, like many other cities, Amsterdam is reflecting on the role and importance of green space in the city. Zef Hemel, Deputy Director at the Spatial Planning Department in Amsterdam, believes that green spaces in large cities are key to restoring the balance between city and country. Amsterdam’s application for candidacy for Floriade 2022 is a translation of that vision. As Hemel explains, “The idea is for a Floriade in the Amsterdam South-East district. Despite all our efforts, public space is not functioning properly here. But the district could potentially have a fantastic green structure, relevant to the inhabitants and providing opportunities for the horticulture sector. To make use of that space for the city’s benefit would be genuinely sustainable.”

Technological innovations play an important role in Amsterdam’s vision: using smart grids, empty office buildings and parking garages which are on the demolition list, for growing vegetables, developing green roofs and facades – everything is being investigated. Energy, waste and water consumption could also be organised in a far more sustainable way. Therefore, Amsterdam is collaborating with cities such as Vienna, Hamburg, Genoa, Copenhagen and the Massachusetts Institute of Technology in Boston.

Amnesia

The annexation of several surrounding villages around 1920 brought large areas of agricultural land within the city’s boundaries. That Amsterdam was indeed con-



Zef Hemel is Deputy Director at the Spatial Planning Department of the City of Amsterdam. He holds the Wibaut Chair at Amsterdam University (UvA). This chair was founded by the city of Amsterdam to deal with the analysis of urban issues.

Zef Hemel will be keynote speaker at the last Floriade Dialogue on 3 September 2012: The Self-supporting City.

“Straightforward urban gardening is not the answer; this would be an under-appreciation of the horticulture sector.”



Vegetable and schoolgardens are still widely used in Amsterdam

scious of the importance of green space and the city's dependency on the countryside became clear when, in 1934, the General Expansion Plan was presented: the western garden cities were implemented. "The new districts had an urban allure," explains Hemel, "but with village-like designs, including allotment garden complexes and school gardens within cycling distance. True to the vision of teacher Jac. P. Thijsse, education and gardening had to prevent the townspeople's alienation from nature." The expansions pushed the agricultural land further out, but an integrated network of waterways and the construction of the central market hall in the 1930s led to efficient food supplies. By the early stages of post-war reconstruction, Amsterdam had become self-sufficient, owing to the implementa-

tion of garden cities. However, this would only last for a few years.

Mechanisation and better transport facilities led to expansion in the agriculture and horticulture sectors. The direct relationship between city and country disappeared. Zef Hemel speaks of 'amnesia': "By the late 1960s, people had forgotten that Amsterdam was once self-sufficient. With the development of new housing estate Nieuw-Sloten, in the mid-'80s, Amsterdam's last horticultural areas disappeared as well. Food and livestock markets in nearby villages such as Aalsmeer, Purmerend and Alkmaar detached themselves from Amsterdam and served global markets." From then on, strawberries came from Spain, and people in Madrid had tulips from Hillegom on their tables.

On top of that, many families left Amsterdam from the 1960s onwards. 'Old Amsterdam' was replaced by terraced houses, enormous infrastructure networks and second-rate facilities in spaciouly designed satellite towns such as Almere, Purmerend, Hoorn and Lelystad. These were 'the new garden cities', established by the government. The result was that, until the 1980s, there was little support for green structures in the city.

A green variation on Occupy Wall Street

But yuppies and students recaptured the city in the 1980s. Since then, there has been a revaluation of Amsterdam and the city's green structures. The new owners have taken possession of the green space, and allotments are flourishing more than ever. Even the school gardens have survived. "However, urban agriculture can no longer play the role it did before, says Hemel. "Amsterdam's menu has changed. Because of the many nationalities in Amsterdam, there is a much broader demand for products. Existing small-scale initiatives cannot begin to meet this demand. These activities should be seen as a positive appeal, a green variation on Occupy Wall Street. But one that needs to be taken seriously!"

This marks the beginning of the thought process on Floriade 2022. "Straightforward urban gardening is not the answer: this would be an under-appreciation of the horticulture sector. But things clearly need to change. City and country should join forces in order to achieve more sustainable food production and to prevent people's alienation from nature. As our forebears did in the 1930s, we should bring city and country closer together, but this time in collaboration with the horticulture sector. The outcome may not yet be clear,

but we need to initiate a dialogue. Small initiatives and a few patches of land are definitely a start, but ultimately action will go much further and become more radical."

Hemel was closely involved in the development of Amsterdam's Structural Vision. In this process, full use was made of 'collective intelligence' and dialogue. In 2009, for a period of six weeks, the Free State of Amsterdam event was held at Tolhuistuin. This event was a platform for residents and experts, totalling nearly 8,000 people. Everyone – from homeless people, philosophers, school children, architects, city planners and students – was invited to share their ideas. Amsterdam also collaborated closely with the city of New York. An exhibition of scale models helped to kickstart discussions about living, food, green space, water, and so on. It resulted in the Structural Vision for 2040, the new open-city plan for Amsterdam, which was ultimately accepted unanimously by the board, with a standing ovation."

'Healing' the city and green space

The same principle applies in the bid for Floriade 2022: participation and collaboration of residents, small businesses and other interested parties. This ensures a very heterogeneous group of people working towards a common goal: "The broader and larger the group, the more result and more support it will get," says Hemel. There are many similarities content-wise between the Structural Vision 2040 and the Floriade bid: "It is not about creating more green space, but about optimally using the green space that is already available. City and country are off balance and need to be healed. The Structural Vision is just a concept. But Floriade 2022 can be a great showcase, generating international interest to create change." ●

Floriade 2022

Almere, Amsterdam, Boskoop and Groningen are in the race for Floriade 2022 Candidates. The winner of the bid will be announced in September 2012.

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“These bottom-up activities should be seen as a positive appeal, a green variation on Occupy Wall Street. But one that needs to be taken seriously!”





The Dutch horticulture sector aims to reduce its greenhouse gas emissions by 30%.

The carbon footprint of a kilogram of tomatoes

Organisations and retailers increasingly wish to understand the sustainability performance of products, such as CO₂ emission. The Dutch horticulture sector has developed a tool for assessing the carbon footprints of vegetables, fruit and flowers. Growers and traders can use this to assess the carbon footprint of their entire product chain.

DANIËLLE VAN GILS

PHOTO: MARCEL VAN DEN BERGH

Dutch entrepreneurs and horticultural organisations have set out to become the most sustainable horticulture sector in the world by 2020. In accordance, the sector aims to reduce its greenhouse gas emissions by 30%. At the same time, there is a growing demand from the food industry for *environmental labelling*. In Britain, many food products already have a CO₂-label. The French government is considering legally requiring *environmental footprinting*. To meet the demand, it is important to determine a footprint to offer insight into CO₂-emissions.

To enable calculation of this carbon footprint, the Dutch Product Board for Horticulture has cooperated with other countries, governments, knowledge institutes and entrepreneurs in developing a standard assessment tool. It is an instrument for horticultural entre-

preneurs to meet the growing demand for sustainability information. The project was carried out in association with the British Standards Institution (BSI), through investments of the Dutch Product Board for Horticulture.

From seed to shop

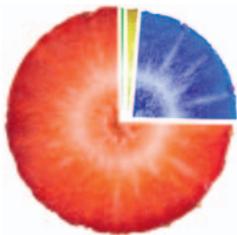
“The standard is an instrument for objectively and quantitatively measuring the horticulture sector’s CO₂-emissions, from seed to shelf”, says Agnes van Ardenne, chair of the Dutch Product Board for Horticulture. Van Ardenne: “With the standard and the related certificates, Dutch entrepreneurs can show the results of their sustainability methods. It is now up to retailers and consumers to express their desire for CO₂ reduction in their consumer behaviour. Our sector is ready to meet those wishes.”

More and more, consumers demand to be properly informed about the origins and the manufacturing of products they buy and eat. Therefore, calculating the carbon footprint is an important tool for horticultural entrepreneurs to demonstrate their conscious efforts to produce in a sustainable way. Philip Smits is general manager of The Greenery, a Dutch company that specialises in the distribution of fresh produce. He notes: “This internationally accepted calculation method gives us entrepreneurs a tool to actually work with. This will help us strengthen our market position.”

The hunger for information

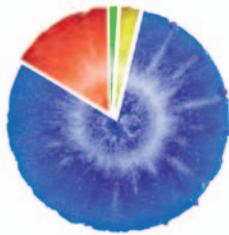
It is the sector’s own responsibility how they communicate their CO₂ performance to the consumer. One way might be through a label, like the energy-efficiency labels found on

Energy cultivation 73%
 Transport 1%
 Soil and manure 3%
 Materials and processing 23%



Strawberry Netherlands greenhouse

Energy cultivation 17%
 Transport 2%
 Soil and manure 4%
 Materials and processing 77%



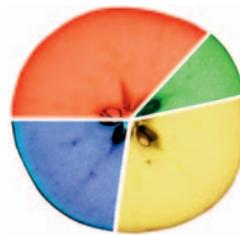
Strawberry Netherlands on shelves

Energy cultivation 32%
 Transport 1%
 Soil and manure 58%
 Materials and processing 3%



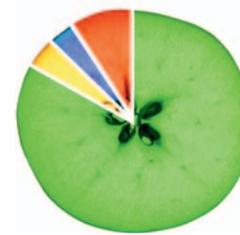
Cauliflower Netherlands summer

Energy cultivation 31%
 Transport 16%
 Soil and manure 30%
 Materials and processing 23%



Apple New Zealand

Energy cultivation 9%
 Transport 83%
 Soil and manure 5%
 Materials and processing 3%



Apple Netherlands

washing machines. In the future, we may find products with CO₂-labels on the shelves in our supermarkets. Wageningen University & Research Centre investigated whether the use of such a label would influence consumer behaviour. A simple label with only the CO₂-emission figures has no demonstrable effect on consumer behaviour. The consumer apparently needs more additional information. According to the research, if the label is expanded to include a reference and explanation of the carbon footprint, more people will choose a more sustainable product. The standard offers more possibilities than merely calculating the carbon footprint. The tool also demonstrates the impact of energy reduction within a company. Also, the entrepreneur can see where in the chain of a specific product emission is highest, enabling him to take possible action.

The online tool (see link at the bottom of this article) helps the horticultural entrepreneur to get a better general understanding of the carbon footprint of a specific product. Certification is much more complicated and costly. It is often necessary to hire a consultancy to help with the calculations. The data and computations then need to be verified by an external controller. After the last corrections have been made, the entrepreneur will receive a carbon-footprint certificate.

Special case

The standard for the horticulture sector is based on PAS 2050, an international, leading method for assessing greenhouse gas emissions of goods and services. "For our sector we needed to answer a couple of specific questions," says Anne Gaasbeek of the Dutch Product Board for Horticulture. "We needed to look into the possibilities to deal with issues such as Combined Heat and Power (CHP) and crop rotation. This specification answers these questions. After all, the climate in the greenhouse and the use of fossil fuels depend on the circumstances outside. A little less or a little more sun has an immediate effect on the use of gas, and consequently on CO₂ emissions. The carbon footprint of a kilogram of tomatoes or a bunch of roses differs from week to week." ●

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How does it work?

Both the standard and the tool assess a product's total greenhouse gas emissions along the entire chain, from farming to transportation. These are the six greenhouse gases from the Kyoto Protocol, expressed in CO₂-equivalents. One CO₂-equivalent (CO₂e) represents the greenhouse effect of the emission of 1 kg CO₂. Accordingly, the emission of 1 kg of methane represents 21 CO₂e, and 1 kg N₂O equals 310 CO₂e. The standard also assesses the emissions of fluorine compounds CFK, PFK and SF₆.

source:
 Statistics Netherlands (CBS)

Floriade Dialogue:

B2B platform of Floriade 2009-2012



**Be part of the theatre in nature,
get closer to the quality of life.**



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