

Globalisation & Landscape Change



JUBILEE CONFERENCE

Editors Adri van den Brink
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KLV | WAGENINGEN
ALUMNI NETWORK

Globalisation &
Landscape Change

JUBILEE CONFERENCE

REPORT OF THE 60TH JUBILEE CONFERENCE OF THE LAND & WATER NETWORK ON 18 MAY 2011

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Preface	1
<i>Adri van den Brink, Wim de Haas, Klaas Jan Beek and Diana Frikkee</i>	
1. Globalisation and food security: The role of land and water use	7
<i>Rudy Rabbinge and Prem Bindraban</i>	
1.1 Introduction	7
1.2 Food security today	7
1.3 Declining availability of land and water resources	9
1.4 Megatrends in agriculture	11
1.5 Food security: a global responsibility	13
1.6 Agro-energy	16
1.7 Conclusion: challenges for land and water use	17
2. Water and food security: integrated scientific and governance-based solutions	19
<i>Colin Chartres</i>	
2.1 Introduction	19
2.2 How much food and water will we need in 2050?	21
2.3 Do we have enough arable land and water to grow more food?	23
2.4 Solutions	25
2.5 Adapting to challenges	26
2.6 Conclusions	28
3. Agricultural landscapes – change patterns and policy challenges	31
<i>Jørgen Primdahl and Simon Swaffield</i>	
3.1 Introduction	31
3.2 Current change factors	31
3.3 Different forms of urbanisation	34
3.4 Changes from within - the significance of local community and new trends in agriculture	36

3.5	Policy frameworks in change	37
3.6	Challenges	39
3.7	Building blocks for an integrated strategic approach – to policy and to research	41
4.	From local to global – on socio-cultural and governance aspects of the organisation and shape of our world	43
	<i>Hans van Ginkel</i>	
4.1	Introduction	43
4.2	The state of our world	45
4.3	Processes shaping our world	48
4.4	Interactions and changing landscapes	55
4.5	An emerging world order?	64
	References	71

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Around the world, the process of economic, political and cultural interaction and integration is advancing. Through adaptations of land and water use, this process of globalisation has consequences for the landscape worldwide, and also for the landscape in our own country. But what are these adaptations, what are the consequences for the landscape, and how can or should we respond to them? This was the theme of the jubilee conference of the Land & Water Network, part of KLV Wageningen Alumni Network.

The Land & Water Network celebrated its 60th anniversary on 18 May 2011. Around 60 guests met in Wageningen for the jubilee conference on the theme *Globalisation and Landscape Change*, chaired by Pieter van Dijk. After an introduction by Kees Slingerland, director of the Environmental Sciences Group at Wageningen UR, this theme was addressed by four speakers: Rudy Rabbinge, Colin Chartres, Hans van Ginkel and Jørgen Primdahl. This volume summarises the contents of their addresses. In this preface, we as the organisers of the conference discuss our reasons for the choice of the conference theme and some of the prominent points that were highlighted during the lectures and subsequent discussions.

The Land & Water Network was established in 1951 as the Study Group for Rural Engineering aimed at promoting research and, as broadly as possible, cooperation and the exchange of experiences between rural engineers. Over the past 60 years, the Study Group has organised numerous meetings and field trips during which a wide range of topics related to rural engineering were presented and discussed. In the early days, these topics all concerned the improvement of agricultural structural conditions, such as water management, infrastructure and land re-allotment, to mention just a few. It is interesting to note that the wider social and economic context in which these activities took place was always an important part of the discussions.

One can rightly say that rural engineering had a strong mission, i.e. to contribute to a prosperous countryside and, by doing so, contribute to social prosperity in general. Of course, this has changed. Other land uses, such as nature and outdoor recreation, have become more important, and rural engineering has increasingly been criticised as being technocratic. Nevertheless,

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its constituent elements, land and water, remained important. The Study Group therefore underwent several metamorphoses and was reborn as the present Land & Water Network with an up-to-date mission: to connect and bring together professionals and scientists working towards a sustainable green-blue living environment, and to stimulate debate on current spatial developments.

This mission is reflected in the theme of the jubilee conference: Globalisation & Landscape Change. Preparing this conference we have identified four key issues. The first is whether we can provide the growing world population with sufficient, high quality food. World food supply is globalising, food chains are becoming more and more entwined and new technologies are developing. Agricultural land is not only used for producing food and feed, but also increasingly for the production of fuels and raw materials. What are the bottlenecks in this development, and how should we deal with them in our efforts to enhance sustainability in our world of today and that of tomorrow?

The second key issue is closely related to the first. Fresh water is one of the most important resources worldwide, but also one that is under intense pressure. Some speak of a global water crisis that may be a source of armed conflict in the near future. Others believe that technical solutions and better arrangements for the division of water use can prevent this terrible scenario occurring. What can we do? If there is a global water crisis, it is important to understand its driving forces and its relationship with climate change, for example. We also need to know which parts of the world are most vulnerable for its impact, and we may also need to think about new concepts of management and governance.

The third key issue focuses on spatial developments. Globalisation is not least demonstrated in major shifts in the use of space. Today more people live in urban conglomerations than in the countryside, and there is no doubt that cities and metropolises will continue to grow. This development certainly has positive effects, such as a declining birth rate and the rise of new forms of vibrant city life. But it also raises important questions about the consequences of this urbanisation for the future quality of life, the relationship between city and countryside and the global division of economic and political power.

The relations between global shifts in the use of space, land and water on the one hand, and broader economic, social and political developments on the other make up the fourth and final key issue that we have identified. This key issue concerns our landscape. The question is what these developments entail for the landscape we live in. What changes in the landscape should be taken into account, and what can we do in terms of planning and design to ease the tension between globalisation and local needs and traditions? Will there still be room for one's own identity or will culturally determined landscape diversity gradually disappear? And is there a need for some kind of landscape policy at European level to maintain the differences between typical landscapes?

Both globalisation and the response to it obviously have major consequences for the planning and management of the environment. The speakers each addressed these consequences from their own viewpoint. They did so against the background of an analysis of the changing driving forces behind those changes in the field in which they work. This produced a wide range of insights. Nevertheless, we feel that we can distinguish five common issues running through all contributions. We have phrased these issues in the form of the following questions.

What is globalisation?

The first issue is a descriptive one: what – in fact – is the nature of globalisation? Several contributions deal with this issue. Van Ginkel, for example, shows driving forces behind globalisation and describes various phenomena associated with it. In his view, globalisation can be described in general terms at a systems level, but also more specifically in terms of processes between actors in urban and rural regions. At this concrete level, unease about globalisation becomes a reality. This is also the level at which discontent with globalisation has its roots. The contribution of Primdahl is an example of how large-scale processes associated with globalisation work in rural Denmark. He describes how the farm properties are sold on the open market, which proves to be very attractive for urbanites who grew up in the area and who are now keen to live there again. This specific form of urbanisation is a very slow process which is not reflected in the statistics.

Is globalisation good or bad?

It makes little sense to try to answer this question in general. But the merits of globalisation can be judged on certain aspects. For example the process of urbanisation which is associated with globalisation. More than half of the world's population now lives in cities. In his contribution, Van Ginkel argues that urbanisation is a good thing. The concentration of people in a city is good; it is even the solution of many problems. His and other contributions in this volume emphasise the issue of the distribution of income and power; globalisation is currently contributing to an unequal distribution of wealth. The real problem of globalisation, however, is the fact that the developed world receives more from the developing world than the reverse. Therefore, it is a challenge for the developing world to acquire a bigger part of the production chain between raw materials and end products. The most profitable part of this chain is now dominated by Northern companies, consequently gaining the majority of the profit.

What are the consequences for world food production?

The question of fair distribution is evident for global food production. It is technically possible to provide sufficient food for the whole world, as Rabbinge and Chartres emphasise in their contributions. In general, there is no shortage of food in the world; we can feed everyone. In North America, Europe, Argentina and Australia, there is enough suitable land, but in other areas where the populations are growing most rapidly there are deficiencies and inadequate social

safety systems. One of the problems is that developed countries have very high food safety levels and produce much more than necessary. This is fine, but the challenge is to intensify production systems in developing countries to a degree that they are less dependent on market systems with very stringent regulations.

Do governments make the right decisions?

In his contribution, Rabbinge has doubts about the substantial quality of the decisions of politicians. Politicians sometimes make choices that a sober scientific assessment indicates will have negative effects. He calls this myopia or short-sightedness. For example, the choice of mandatory blending of biodiesel has a negative impact on food production. Also the preference of some politicians for the restricted use of fertilizers is a threat to high food production levels. Finally, politicians generally have a tendency to develop very specific and therefore counter effective rules for innovation processes.

Apart from the decision making process, at system level, land management systems (rules, regulations, institutions, habits) are outdated. In developing countries at least, regulation is often no longer fit for the purpose of modern reality. Sometimes institutions are fifty to sixty years old, such as the water regulations in India which are still based on the old canal network, whilst 80% of the irrigation water currently comes from groundwater. We need to rethink these systems because they are not changing fast enough. In the developed countries, similar problems exist: systems of planning and management often focus on the problems of the past. In spatial planning, for example, outdated images of the differences between town and country dominate. Attempts are made to solve problems with regulations focusing on just one aspect of the problem. However the solution for obsolete systems is not a technical approach to scales and systems, but a different attitude to problems: aimed at creating quality.

The role of the public is important to overrule political myopia. The ordinary citizen must develop awareness in the careful use of food, avoiding unnecessary products and reducing waste.

What is the role of the expert?

Experts have considerable influence on the solution of the questions that globalisation entails. There is much distrust among experts, as the climate change debate has learned. The expert should not restrict his/her own role to 'speaking truth to power' but should act as an 'honest broker', as Rabbinge proposes. This also has implications for the training of young people. Education programmes should focus on the role and responsibility of experts. This requires that we do not rely on what happened ten, twenty or thirty years ago, as everything changes very fast. Education programmes must ensure that attention is devoted to the latest developments. It is also important that young people are enabled in their training to gain practical experience. They should be aware of what happens in the field, because that's where globalisation is happening.

Young people should learn to take an interdisciplinary approach. Nowadays, higher education tends to be organised along disciplinary lines; more attention should be given to this.

We realise that these issues and questions need more consideration and discussion than is possible at a one-day conference. Nevertheless, we hope that the results of the conference, as laid down in this publication, will help all those who are working on or interested in land and water issues to gain a better understanding of the broader international context of their activities.

Lastly, we would like to thank our speakers for sharing their insights with us. We would also like to thank our sponsors Arcadis Nederland, the Environmental Sciences Group of Wageningen UR and KLV Wageningen Alumni Network, which facilitated the conference and this publication. Also thanks to students Diana Beljaars and Maartje Kuiper for their assistance.

1. GLOBALISATION AND FOOD SECURITY: THE ROLE OF LAND AND WATER USE¹

Rudy Rabbinge² and Prem Bindraban³

1.1 Introduction

At the dawn of the 21st century, the soaring demand for virtually all commodities to meet human needs is putting huge pressure on global resources. Major concerns are still the hunger suffered by nearly one billion people and the appalling poverty of over a billion people earning less than 1 dollar a day. Concerns for energy supply and attempts to reduce greenhouse gas emissions (GHG) have recently led to the compulsory blending of fossil fuels for transport with biofuels and subsidised production of energy from biomass, as in the EU, USA and Brazil. This adds a new and potentially huge demand on global natural resources. It is unclear whether these demands can all be met whilst preserving biodiversity and bringing more social and economic equity to the world.

However, these concerns are important for promoting optimal use of the world's resources for sustainable development. Agriculture must make a major contribution to resolve many of these issues. The role of agriculture as a motor for overall economic growth has been recognised. Food production must increase dramatically in the coming decades, yet it is agriculture that makes the greatest claim on natural resources, including land and water.

In this paper we will discuss food security in a globalising world. In particular, we will focus on the pressures on natural resources and on the challenges these pressures entail for land and water use.

1.2 Food security today

Estimates of global food production potential based on a production-ecological approach counter Thomas Robert Malthus' prediction that 'the power of population is indefinitely greater than the power in the earth to produce subsistence for man' (*An essay on the principle of population*, 1798). As could be shown, global production potential surpasses food requirement even if the global population exceeds 10 billion consuming a meat-rich diet. The analyses however revealed great differences in production potential between global regions. Asian countries lack production capacity to be self-sufficient in food whilst other global regions, such as Latin America, have surplus capacity. This suggests that a global redistribution of food is essential to secure food for all.

¹ The text of this chapter is largely taken from: Bindraban, P.S. and Rabbinge, R. (2011) European food and agricultural strategy for 21st century, *Int. J. Agricultural Resources, Governance and Ecology*, Vol. 9, Nos. 1/2, pp. 80-101. See this article for additional explanation and references. The authors wish to thank Adri van den Brink for his excellent job in compiling this paper.

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Current food production, demand and trade values show that virtually all the food consumed in Europe is produced on its own territory. Over 250 million tonnes of cereals are produced against a total consumption including feed of slightly less than 250 million tonnes. Meat net trade is a fraction of consumption only. Europe is a net exporter of commodities, such as eggs, potatoes and milk, and a net importer of fruit and vegetable but with total per capita supply doubling amounts strictly needed for a healthy diet. Europe imports about one-third of its vegetable oils and fats and is fully dependent on imported soya beans. This situation of food self-sufficiency is not likely to change much in a business as usual scenario in the coming decades, nor even under full trade liberalisation.

As shown in Figure 1.1, some global regions will barely be able to be self-sufficient in food as production will be constrained by the availability of land and water. This will even apply with the most efficient use of natural resources. A ratio above two in Figure 1.1 can be considered secure because it assumes that half the modelled production levels would be attainable worldwide by the year 2040. For example, potential grain yields are calculated to reach $11 \text{ Mg ha}^{-1} \text{ y}^{-1}$ in temperate regions, whilst actual European yields reach $6 \text{ Mg ha}^{-1} \text{ y}^{-1}$, with maximum yields exceeding $10 \text{ Mg ha}^{-1} \text{ y}^{-1}$ in some specific locations only such as the Netherlands. On the other hand, current cereal yields in most African countries hardly exceed $1 \text{ Mg ha}^{-1} \text{ y}^{-1}$, while calculated yields reach 5 to 6 times these amounts.

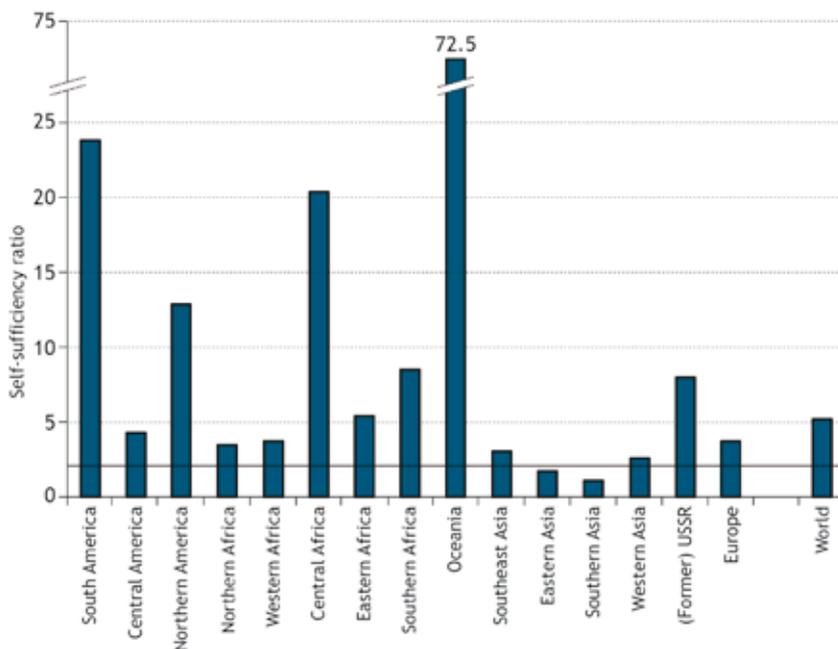


Figure 1.1: Self-sufficiency ratio for global regions consuming a meat-rich diet for a medium population projection of 9.4 billion in 2040.

Southern Asia, comprising India and the Near East, and Eastern Asia primarily representing China, will hardly be able to feed their own population. The production potential in North America, the former Soviet Union and Australia exceed food requirements. The same applies to Europe, while Latin America has the greatest potential, also in absolute terms. The production potential of the African continent exceeds demand by the African population too, indicating that the current food shortages result from underdeveloped agriculture. These regional differences also illustrate the need for a physical redistribution of food among regions to attain food security worldwide.

1.3 Declining availability of land and water resources

The availability of natural resources per person is steadily declining and access to resources, particularly by poor people, is rapidly shrinking. A growing population and growing demand for food, feed and fuel, with local problems of water pollution and soil degradation may trigger social tension. The unbridled purchase and long-term lease of extensive land areas by developed and wealthy nations, coined as land grabbing, mostly in sub-Saharan Africa, may lead to increased social tension. A less obvious claim on land is the control of production volumes of agricultural commodities by multinationals, such as in the soya bean chain.

The availability of suitable agricultural land is severely limited in most Asian countries with little space for expansion. The amount of agricultural land per person has steadily declined and will continue to decline due to population growth. India has virtually no permanent pastures into which it can expand its arable land and little natural land to take into cultivation. So far, the acreage per person could be maintained in China by the conversion of natural lands into pasture and arable land. Bangladesh is worse off and has to feed itself with 635 m² per person (Table 1.1). Even with a double crop and with increasing rice yields, the population could barely afford itself a vegetarian diet. Even though China has twice as much land per person and 50% higher rice yields than Bangladesh, the figures indicate the overall need for food imports by Asian countries. Furthermore, much of the most suitable fertile lands are occupied by growing cities and other hard infrastructure.

Land is abundantly available in Latin America, reflecting the huge potential to export food, certainly with the expansion of the agricultural frontier. A relatively large availability also applies to large European countries. Densely populated regions have inadequate amounts of cropland, like the Netherlands which has a mere 1179 m² per person. The Netherlands could certainly meet a vegetarian diet under an organic system without the use of fertilisers. However, it is unclear why that should be done, as environment and health do not require such a ban. While the Netherlands is a net importer of food and the second exporter of agricultural produce in the world, Europe as a whole holds a surplus production potential, up to four times its requirements. In sub-Saharan African countries, land is abundantly available relative to the low population densities.

	Arable land		Agricultural land		Required yield		Actual yield	
	2005	2005	2005	2005	Vegetarian diet	Meat diet	2005	2005
	m ²	m ²	m ²	m ²	Mg ha ⁻¹	Mg ha ⁻¹	Mg ha ⁻¹	Mg ha ⁻¹
Bangladesh	593	635	8.6	24.1	3.7			
China	1181	4204	1.3	3.6	5.2			
India	1538	1633	3.4	9.4	2.5			
Indonesia	1643	2146	2.6	7.1	4.3			
Argentina	7615	33385	0.2	0.5	4.2			
Brazil	3573	14141	0.4	1.1	2.9			
Paraguay	6980	39393	0.1	0.4	2.1			
France	3246	4888	1.1	3.1	7.0			
Germany	1463	2060	2.7	7.4	6.7			
Netherlands	577	1179	4.6	13.0	8.3			
United Kingdom	964	2831	1.9	5.4	7.2			
Ghana	2887	6664	0.8	2.3	1.4			
Kenya	1670	7888	0.7	1.9	1.6			
Mali	3580	29205	0.2	0.5	1.1			
South Africa	3313	21007	0.3	0.7	3.3			
Tanzania	2700	8962	0.6	1.7	1.5			

Table 1.1: Agricultural land per person, required and actual cereal yields.

Production constraints are also imposed by the lack of water. Food production is almost linearly related to water use, approximating 1000 litres of water for 1 kilogram of grains. It therefore takes 1500 litres water to produce a vegetarian diet to over 5000 litres for a meat-rich diet per person per day, which converts to 547 and 1825 $\text{m}^3 \text{p}^{-1} \text{y}^{-1}$, respectively. These values are similar to estimates by other authors of the water requirement for food production of 600-900 $\text{m}^3 \text{p}^{-1} \text{y}^{-1}$ for African and Asian diets and 1700-1800 $\text{m}^3 \text{p}^{-1} \text{y}^{-1}$ for North American diets. The availability of water per person in India and China is sufficient for food production and is declining, while use for other purposes has still to be accounted for.

The huge availability of water in countries like Brazil, Indonesia and Central Africa is due to their tropical climate and land dominated by rainforests. The agricultural corridor in sub-Saharan Africa is situated in the semi-arid and semi-humid regions running from Western to Eastern Africa south of the Sahara and along the east from Ethiopia to South Africa crossing the highlands and great lake area. Though water availability is not high in these agricultural areas, there is still sufficient scope to increase the current low yields because water is not the prime limiting factor to yield but lack of nutrients due to poor soils. This scope to increase yield given the available water applies less to Asian countries where yields are 2-4 times higher than in Africa and where fertiliser application is also high.

1.4 Megatrends in agriculture

Future food security is heavily influenced by a number of developments that can be grouped into six megatrends in agriculture. The first of these megatrends is productivity rise. In the Netherlands, for example, land productivity increased 5 to 6 times in the past century. In the same period, labour productivity increased 200 to 300 times, while energy and other inputs increased 2 to 4 times in their use efficiency. Yields are expected to continue to increase, though levelling off.

The second megatrend can be called 'From craft to industry'. Whereas agriculture traditionally had to adapt to nature and to environmental uncertainties, it is increasingly able to control production and the use of inputs such as fertilisers and pesticides. There is much scope to further optimise input use, whilst increasing production and reducing environmental impact. Crop modelling techniques make it possible to identify optimal timing strategies for fertiliser application, for example, and nutrient balances can be further closed to minimise losses. Insights into ecological predator-prey principles allow reduction of agro-chemical use to a minimum. Close-sensing allows early detection of plant stress from diseases, and water or nutrient shortages to take timely actions and prevent losses, while global positioning systems with close and remote sensing facilitates precise spatial applications. Farming systems are designed to minimise environmental impact, whilst maintaining high and economically viable production levels. The introduction of non-terrestrial substrate agriculture, especially in greenhouse production, has made it possible

to minimise resource use by computerised circuits to close nutrient and water cycles. During the summer, heat is stored in aquifers for heating during winter and application of additional radiation is minimised by special lamps. Glasshouses are developing from big energy consumers into net energy producers. Robotised milking and harvesting of greenhouse products boost the already high labour productivity. Alignment of agricultural and industrial activities in their regional setting further optimises the reuse of natural resources. These integrated approaches will allow Europe to maintain its leading position in global agriculture that attains high levels of productivity in terms of land, labour and capital, while minimising environmental side effects.

The third megatrend is improved chain management. The subsequent steps in agricultural production up to consumption of (processed) agricultural products are increasingly regarded and managed as the links of a continuous chain ('from spade to plate'). The reverse is also true: agricultural production is increasingly consumer (or retail) driven. The need to supply low cost, safe and high quality food, the need to minimise environmental impact and the demand for convenience foods etc. are important factors in this integrated chain management approach. Logistic efficiency, such as on time delivery, strongly influences the unit cost of production. Value is added on at numerous stages of the chain and accumulates at the end of the chain. The fourth megatrend is implied in the previous ones. This megatrend refers to agriculture that, due to tightening social and political constraints, increasingly aims at multiple objectives besides food production. This means, for example, an environmentally and animal friendly production method (no pollution or waste, good living conditions), and concern for the landscape. In further integrating social, economic and ecological objectives, the challenge is to combine various functions at farm and regional scale. This implies the integration of plant and animal production with environmental care, conservation of nature and the composition of landscape, and care for health and wellbeing, including tourism and recreation.

The fifth and sixth megatrends are the increasing attention for food and health in society and the rise of the bio-based economy. It is generally acknowledged that fruit, vegetables and fish are good for health. Agriculture aims to supply a health inducing component in its products through choices in input, farming systems and consumer-oriented processing (products with less polyunsaturated fats, for example). The concept of Good Agricultural Practices applies to on-farm production and post-production processes, resulting in safe and healthy food and non-food agricultural products, whilst taking into account economic, social and environmental sustainability. This includes land and water conditions. Tracking and tracing systems also strongly contribute to controlling food safety as they enable the rapid identification and reporting of the spread of animal diseases in the production chain or the source of toxicants (BSE, dioxin). Finally, the rise of the bio-based economy challenges agriculture to produce new products such as biofuels and biomaterials, implying the introduction of adapted crops and new systems of production and processing (biorefinery, for example). These new products obviously compete

with food production for a growing world population. Bioenergy as such should therefore never become an aim in itself but as the final residual product in biorefinery and biocascading it may help limit waste.

1.5 Food security: a global responsibility

The world's population is expected to increase from 6 billion people in 2000 to 9 or 10 billion in 2050. These people will need access to a rich calorie diet and access to a diet based on animal products (increasing wealth leads to increasing meat consumption). As a consequence, double the amount of primary products is required in 2050 for food and livestock feed. This can only be achieved by extending farmlands and through higher land productivity. Unfortunately, the potential for increasing agricultural acreage is limited, due to desertification and urbanisation, the protection of biodiversity, and limited water availability. Progress in food production is urgently needed to combat hunger in many parts of the world. It must be noted that hunger today is primarily a matter of access to food. World food production is globally sufficient, but the majority of food is locally produced and consumed. Therefore surpluses in Latin America cannot solve structural shortage in Africa. That requires economic development in Africa, starting with agriculture, as food insecurity is most present in rural areas.

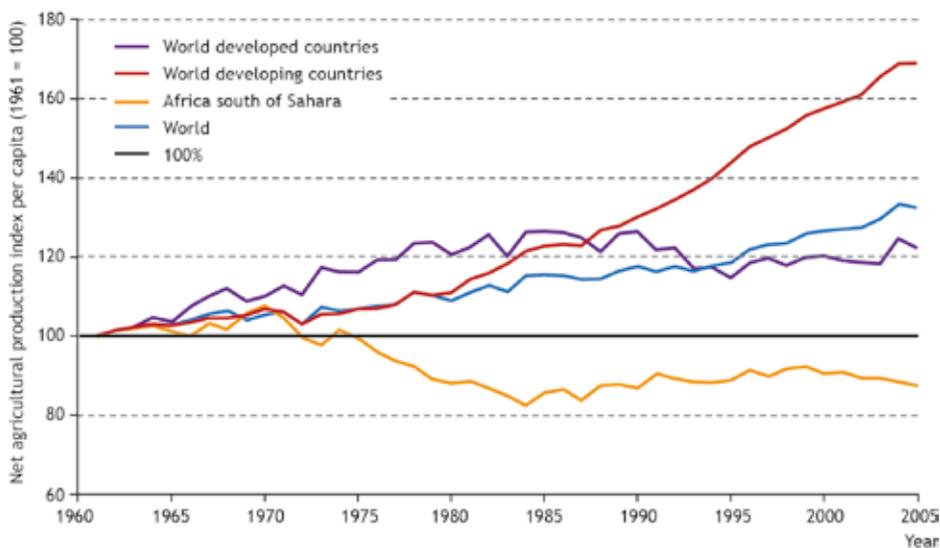


Figure 1.2: Decreasing availability of food per person.

As Figure 1.2 shows, food availability per person has risen considerably in Asia and Latin America in the decades between 1960 and 2000. In China, the accelerated consumption of meat as a result of rising income produces large claims on feed that is increasingly being supplied from

Latin American countries. Imports of soya beans for pigs and chickens by China have increased from 5 million tonnes in 1990 to over 40 million tonnes in 2009. India has increased its soya bean production from a mere 2 million tonnes in 1997 to over 8 million tonnes in 2006 to feed its chickens, whilst imports have yet to take off. The increasing demand for more luxurious food items creates a great export opportunity for Europe. It could thereby emphasise high quality food products like meat, milk and processed food items, but should exploit its own production capacity for the production of its feed and raw material. Cereals and even soya beans or substitute fodder crops could be produced to feed its livestock. Importing feed shifts the pressure on natural resources to other parts of the world, primarily Latin America and Africa, and Europe would not bear its share in redistributing food, i.e. in virtually redistributing land and water. Moreover, nutrient cycles can be better closed with geographically linked feed and meat production as this prevents the transport of nutrients overseas. Europe could turn the slowdown of its internal food market volume into an opportunity to supply the high quality market segment of Asian consumers, which could become a major driver for Europe to revitalise its agricultural sector.

Latin American countries have a relative abundance of productive land and even more importantly, of available fresh water (see Table 1.1). Not surprisingly, virtually all nations in the world have found their way to these countries to satisfy their growing demands for food, feed and fuel. The global importance of Latin America in providing food, feed and fuel to the world is so vast that how Latin American countries manage their natural resources is becoming a concern for the international community. Overexploitation of the enormous biodiversity of the world's largest rain forest area, for example, would not only affect the economy and ecology of Latin America, but of the world as a whole. The efficient use of the natural resources of Latin America and planned exploitation is essential for its sustained development. Poorly planned, abusive and inefficient use of natural resources always comes at a high price, curtailing economic development opportunities, causing social unrest and jeopardising the sustenance of ecosystems (agro-ecosystems and natural ecosystems).

It is for these reasons that some nations, particularly in Europe, are concerned with the sustainable exploitation of the natural resources, inside and outside Europe. In Europe, sustainability criteria such as those presented in agreements on Good Agricultural Practices and stringent conditions for agricultural production are imposed on farmers, but also on other actors and activities along the production chain. It is also in Europe's interest to support the sustainable exploitation of natural resources outside its territories. Europe imports large quantities of soya beans from Latin American countries, for example, and global demand is growing so fast that strong governance is needed for soya bean growth and expansion to become more sustainable.

Platforms are needed and have been installed in recent years (for example the Round Table on Responsible Soy – RTRS) to negotiate the desires of the various actors worldwide who are

directly involved in the chain and stakeholders who have an indirect effect on chain behaviour to arrive at acceptable sustainability principles. A fair representation of all stakeholders throughout the entire supply chain and transparent communication among the stakeholders and with a broader public are essential components of the governance structure of these platforms. Sustainability criteria are collectively developed for all kinds of agri-business related activities that can be implemented under practical conditions. Non-governmental organisations serve as the conscience of the world and its people; the private sector is increasingly assuming its corporate responsibility by considering the people and planet dimension in addition to the profit dimension in their undertaking, and governments are seeking ways to guide global development processes. Research institutions can provide these processes with options for viable ecological, social and economic practices that increasingly comply with sustainability criteria as set by the platform. It is through these mechanisms that Europe could make a great effort to support the development of sustainable production systems.

Figure 1.2 also shows that progress in food production has been so disappointing for sub-Saharan Africa (SSA) that it faced a 12% reduction in food availability per person over the past four decades and has over 180 million malnourished people. It is increasingly recognised that agriculture plays a pivotal role, not only in food production but also in overall development. After all, agricultural development has served as a stepping stone for overall economic development in developed nations and in newly developing economies in Asia. Today, 90% of the African population lives in rural areas and 70% of the labour force works in the agricultural sector. Agriculture generates 30-60% of GDP which indicates that labour productivity is low compared to other sectors.

Yield is a strong indicator for progress in agriculture and suggests a poor overall development as crop yields have only marginally increased in SSA over the past four decades while the increase in total production is mainly due to the expansion of agriculture area. The harsh biophysical conditions call for concerted action to raise crop and animal production. Much of the continent has infertile weathered soils and little fertile alluvial and volcanic soil; severe pest and disease pressure, fatal animal diseases and an erratic water supply further depress land productivity. However, the potential to increase yields is substantial. Pronounced improvements may be obtained with the simultaneous use of various inputs. The intense geographical variation in the mineral content of soils necessitates location-specific fertilisation strategies to optimise impact on productivity and location-specific breeding strategies to cope with the high variability, where biotechnology might appear a valuable tool. Targeted breeding with biotechnology could be supported by European scientists, which will also enhance their knowledge and insight into a technology that is not yet fully accepted by Europeans. As a result, Europe will improve its global competitiveness in green biotechnology and might even stimulate its own overall economic development. Similarly, integrated approaches on nutrients, pests and diseases, and water management can be stimulated by European scientists to raise productivity.

Inspired by the UN Millennium Development Goals (MDG), various plans were developed to improve the livelihood of the African people, including a strategic plan for harnessing science and technology for agricultural development in Africa and a plan to combat hunger by the Hunger Task Force of the United Nations. Despite many reports and strong political commitment, actual support has been declining, and foreign direct investments in the poorest countries are extremely low. Currently, China is investing heavily in the African continent to secure its own national demands. Also, organisations such as the New Partnership for Africa's Development and the Alliance for Green Revolution in Africa have started to support agricultural development, primarily by emphasising the development of the institutional conditions for input and output markets and capacity building, as well as by extensive programmes on input supply such as fertiliser and healthy seeds and agro-dealer networks. Private charity foundations are leading initiatives in stimulating rural development. Europe could assume a more decisive role in supporting agricultural development in Africa. While this would alleviate the continent from its worst inhumane living conditions, it would also benefit Europe and European agriculture by increasing its agribusinesses in inputs such as seeds and agro-chemicals as well as mechanisation and knowledge and expertise in integrated agriculture. The whole food chain including food industries is pivotal for such development.

1.6 Agro-energy

The demand for agro-energy has suddenly increased in recent years because of policies for compulsory blending of transport fuel and subsidies for the production of biomass for energy. A number of concurrent global problems have fuelled the sense of urgency for biofuels. CO₂ neutral energy from biomass would be a good response to curb climate change, and would allow countries to comply with the Kyoto agreements to reduce CO₂ emissions. The dispersed production of energy throughout the world suits the current geopolitical strategies to reduce the dependence on a few energy suppliers. In OECD countries, biofuels are seen as a way out of misery for the rural population due to the dwindling agricultural sector and have been strongly lobbied for by the agri-business. Investors have also been charmed by the idea that the global potential of biofuels could be high. However, the sudden and uncontrolled interventions in the flow of food commodities have already caused price shocks and insecurity in the food sector, leading to an estimated additional 50-100 million people to go hungry in 2007.

Production of biomass for biofuels will put additional claims on natural land because all current agricultural land will be needed in the coming two or three decades for the production of food and feed. The clearing of natural lands will cause emissions of CO₂ because of the removal of vegetation and decomposition of soil organic matter ranging from 20 to over 350 tonnes C ha⁻¹. The prevented CO₂ emissions from biofuels reach maximum values up to 3 ton C ha⁻¹ but could even be negative under poor agronomic and chain management. It may therefore take 20 to over 150 years to recover the initial losses of CO₂ emissions. Also, N₂O emissions help negate

most of the potential CO₂ savings. Biofuels therefore worsen rather than reduce climate change. The growing scientific evidence for the detrimental effects of biofuels on ecology and society has raised political debate in the EU leading to stringent sustainability criteria and the call by civil society organisations to even abolish or reduce the obligatory blending targets. The relative contribution to energy supply is very limited, the GHG emission reduction absent and much land is needed to make a substantial contribution to threatened food supply and rising prices.

1.7 Conclusion: challenges for land and water use

One of the most important components of sustainable development is the efficient use of natural resources. Social and economic sustainability strongly depend on priorities given to human desires and the values attributed to commodities can be manipulated, for example by changing habits or through subsidies and tax exemptions to affect prices. To attain ecological sustainability, however, hard bio-physical principles should be respected, such as water and land availability that limits the quantities that can be produced. These conditions have revealed the need for a global redistribution of land and water resources between surplus and deficit regions in the production capacity of food.

Global water problems in particular call for attention. Worldwide freshwater withdrawals amount to about 4,000 Gm³. Most of this water is used for agriculture (2,800 Gm³ or 70%). Water withdrawals for agriculture are expected to increase, due to population growth and the increasing consumption of water-demanding diets (meat), while competition with other water-demanding sectors and water pollution will negatively affect water availability. Overall opportunities to find a way out of these problems include the introduction of other crops and water-saving practices at farm level, the expansion of irrigated land for food and changes in land use, such as the allocation of marginal agricultural lands to nature conservation. Such opportunities may be implemented at farm level as well as at river basin level. In many cases, however, implementation is hindered by the lack of infrastructure, inadequate farmer skills, poor communication between farmers and irrigation engineers, lack of labour force or political opposition.

The production capacity of Europe is sufficient to secure its own food needs on its own territory and to contribute to the required global redistribution of natural resources. Nevertheless, Europe could assume its responsibility to reduce its claims on natural resources, such as indirect claims on land for soya beans in Latin America for the production of meat, whilst hardly affecting its meat consumption. Europe could continue to develop highly productive integrated production systems that close nutrient and water cycles as much as possible to make most efficient use of natural resources, with high labour and capital productivity, applying precision agriculture and other advanced technologies. These highly productive systems will in turn alleviate space for multifunctional agriculture and land use for specific non-food services desired by its wealthy population. In the international arena, Europe can pursue a differentiated strategy towards

different global regions. It could specifically stimulate trade in high value food commodities with Asian countries because of their increasing economic demand. Europe could assume greater responsibility with regard to supporting the development of the agricultural sector in sub-Saharan Africa to secure food and alleviate poverty. Europe could take a leading role in supporting multi-stakeholder processes to govern the sustainable exploitation of the world's natural resources, particularly in Latin America, as this continent will have to assume a major role in supplying the world's food deficit regions. Europe does not need agro-energy to stimulate its agricultural or rural development. It should discontinue its compulsory blending targets and subsidies for biomass production, as these will not contribute to the desired environmental and energy.

While economic forces increasingly drive the developments of agricultural production systems and trade flows, differences in production potential and in consumer desires in the various global regions will increasingly affect these developments. Even in open market conditions, trade takes place between industrial partners and must comply with rules and regulations set by policies. It would be in the European interest to further define its agricultural strategy from a global rather than just a European perspective, benefitting more from differences in ecological conditions.

2. WATER AND FOOD SECURITY: INTEGRATED SCIENTIFIC AND GOVERNANCE-BASED SOLUTIONS

Colin Chartres¹

2.1 Introduction

As scientists, we tend to compartmentalise many issues, disciplines and even sub-disciplines. Our curiosity about how things work also drives us down increasingly reductionist pathways. In fact, we try to reduce complexity in order to understand function and processes. In many cases, this has led and will lead in the future to amazing discoveries that have generally been of great use to humankind. The “Green Revolution” of the 1960s and 70s, that some claim saved a billion people from starvation, had its roots in relatively straightforward but critical improvements to wheat and rice genetics that could be delivered with conventional breeding approaches. These improvements were bolstered by better access to fertilizers and irrigation, and were delivered fairly easily from the laboratory to the farmer. These scientific advances saw crop yield climb steadily until the end of the last century. Since then, however, yields have plateaued and growth has largely stagnated. Some commentators attribute this to the declining investment in agricultural research and development, particularly in the Consultative Group on International Agricultural Research (CGIAR). To some extent, this may be true, but the world of the 21st century is also a very different place from that of the 20th century.

Population growth driven by improved healthcare and availability of food has been rampant. In 1960, there were approximately 3 billion people on the planet, compared with around 7 billion today and a forecast of over 9 billion by 2050 (Figure 2.1).

Competition for arable land and water resources has become intense, not only from food and fibre producers but also from growing urbanisation and industrialisation, and more recently from biofuel production. People’s diets in the developing world are also changing fast, as their spending power increases with a trend towards higher protein, animal-based products that require the cultivation of more cereals to feed the animals and more water to grow the cereals. Finally, we have the spectre of climate change (Figure 2.2). Despite the uncertainty surrounding this area in terms of detailed impacts, there is growing evidence to suggest that crop yields will be increasingly affected by rising temperatures and more erratic rainfall patterns and that water supplies will also be impacted in many countries.

In addition, we are faced with a considerably greater human footprint on the environment than was apparent 50 years ago. This footprint is not only responsible for the consumption of

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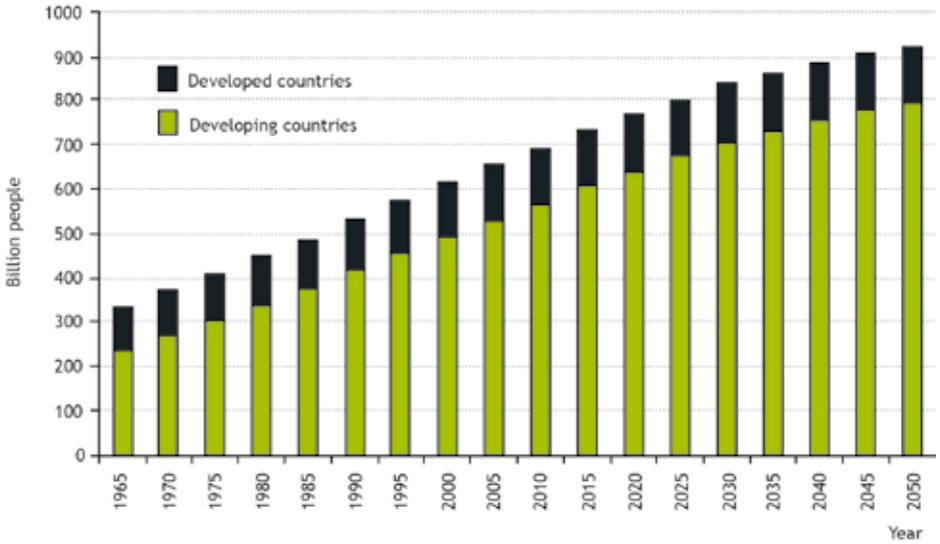


Figure 2.1: World population growth 1965-2050. Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2007).

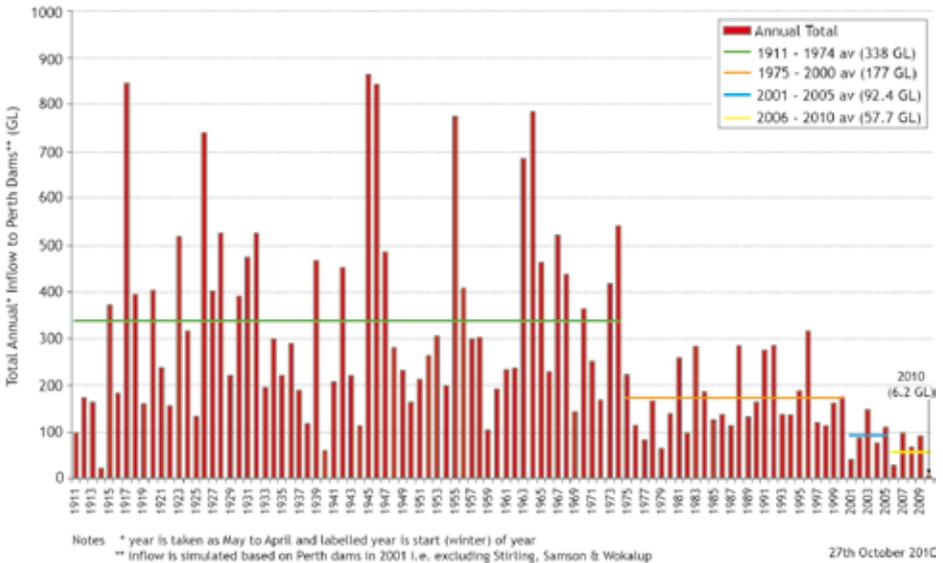


Figure 2.2: Impact on water availability – reduced inflows to dams (acknowledgments to the Water Corporation, Australia).

natural resources at a rate faster than their replenishment, but also for widespread and serious environmental degradation that is threatening the ecosystem services on which we rely. So, we are entering an era of much greater complexity than was faced by the fathers of the Green Revolution, Norman Borlaug and M. S. Swaminathan, to whom we owe so much. This complexity leads us to ask how we should best approach the issues facing food production and natural resources management in the future. Should we take a reductionist approach, dependent on laboratory breakthroughs in plant breeding for higher yields and greater environmental tolerance, or should our approach be based on better marshalling of what we have and know now and more integrated analysis and understanding of our agro-ecological systems? Only time will tell, but this paper aims to provide details of the food and natural resource management challenges confronting us and looks at some potential solutions.

2.2 How much food and water will we need in 2050?

There have been a number of attempts to estimate total food production requirements by 2050 and all of these generally hinge around the adoption of the UN median estimates of population growth (around 9 billion by 2050), assumptions of individual calorific needs (Figure 2.3), allowances for wastage at harvest and post purchase, and the proportions of animal products in the diet. The FAO (2009) has estimated that food production will need to increase by 70% and that annual cereal production will need to rise to about 3 billion tonnes from 2.1 billion today and annual meat production will need to rise by over 200 million tonnes to reach 470 million tonnes.

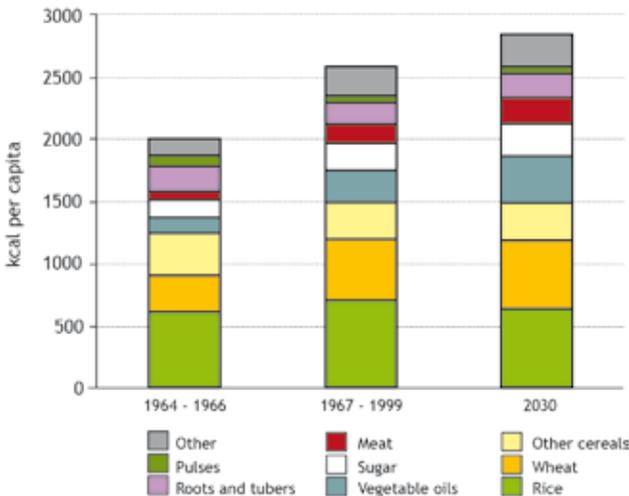
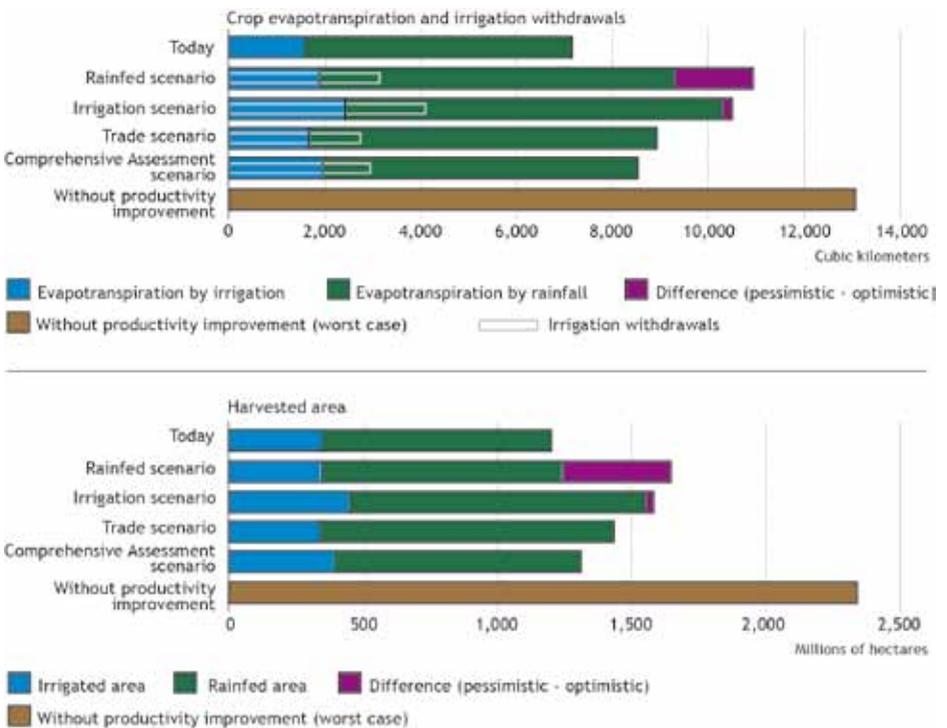


Figure 2.3: Calories from major commodities in developing countries. Source: <http://www.fao.org/DOCREP/005/AC911E/ac911e05.htm>.

Such a large increase in food production will also require very significant amounts of fresh water. In the last 30 or 40 years, we have moved relatively quickly from a world of land, water and ecosystem abundance to one of increasing scarcity. The absolute amount of freshwater and land available remains finite, but the number of people competing for the use of these resources continues to grow. Globally, agriculture currently uses 70% of the world’s developed freshwater, and in some developing countries up to 90%. The need for water to support ecosystems plus the growing demand for water from industry and urban populations will require significant changes in how we use water.

The Comprehensive Assessment of Water Management in Agriculture (Molden, 2007) concluded that at current levels of water productivity, water requirement would increase from about 7,000



Note: The figure shows projected amounts of water and land requirements under different scenarios. The Comprehensive Assessment scenario combines elements of the other approaches (see chapter 3 for details). The purple segments of the bars show the difference between optimistic and pessimistic assumptions for the two rainfed and two irrigated scenarios. The brown bar shows the worst cases scenario of no improvement in productivity.

Source: International Water Management Institute analysis done for the Comprehensive Assessment for Water Management in Agriculture using the Watersim model.

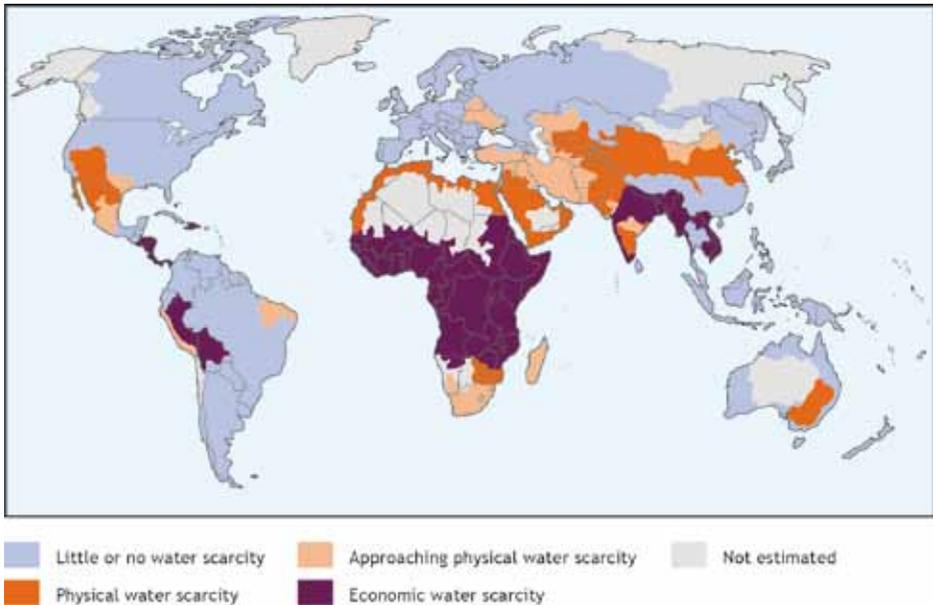
Figure 2.4: Scenarios from ‘Water for Food, Water for Life’ (Molden, 2007).

km³ in 2000 to 13,000 km³ in 2050 (Figure 2.4). Similarly, arable land would need to increase from about 1,200 million hectares in 2,000 to 2,400 million hectares in 2050.

Chartres and Varma (2010) similarly estimated that to feed 9 billion people a diet of 3000 calories per day, allowing for some wastage, we would need to utilise a further 2500 – 3000 km³ of water every year based on the assumption that to produce 1 calorie of food requires 1 litre of water on average.

2.3 Do we have enough arable land and water to grow more food?

The above estimates present us with a major problem in that, although theoretically there is enough land and water available globally to increase production to required levels, they are generally not in appropriate places geographically or climatically. Furthermore, even if the food



Definitions and indicators

* Little or no water scarcity. Abundant water resources relative to use, with less than 25% of water from rivers withdrawn for human purposes.

* Physical water scarcity (water resources development is approaching or has exceeded sustainable limits). More than 75% of river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of return flows). This definition - relating water availability to water demand - implies that dry areas are not necessarily water scarce.

* Approaching physical water scarcity. More than 60% of river flows are withdrawn. These basins will experience physical water scarcity in the near future.

* Economic water scarcity (human, institutional, and financial capital limit access to water even though water in nature is available locally to meet human demands). Water resources are abundant relative to water use, with less than 25% of water from rivers withdrawn for human purposes, but malnutrition exists.

Source: International Water Management Institute analysis done for the Comprehensive Assessment of Water Management in Agriculture using the Watersim model; chapter 2.

Figure 2.5: Areas of physical and economic water scarcity from 'Water for Food, Water for Life' (Molden, 2007).

can be grown elsewhere from its place of consumption, there are major issues as to whether some developing countries suffering food and water shortages have the money available to import it. Water scarcity is of serious concern in many regions of the world (Figure 2.5).

It takes two forms. The first is physical, in which the majority of the total available water resources are already being used. The second is economic, in which there has not been sufficient investment to deliver water to where it is needed for agriculture, drinking, or urban/industrial uses. Given the competition for water from other sectors of the economy and the environment and due to climate change induced reductions in availability (at least at the right time and place), it is highly likely that agriculture’s share of available water resources will decline.

Whilst there may be sufficient arable land available to significantly increase food production, up to half the world’s agricultural land is degraded to some degree. The Global Assessment of Human-Induced Soil Degradation (GLASOD) was the first attempt to estimate the extent of soil degradation globally (Oldeman et al., 1991). Based on expert opinion, it remains the main source of degradation data (Figure 2.6). According to GLASOD, degradation of croplands is most extensive

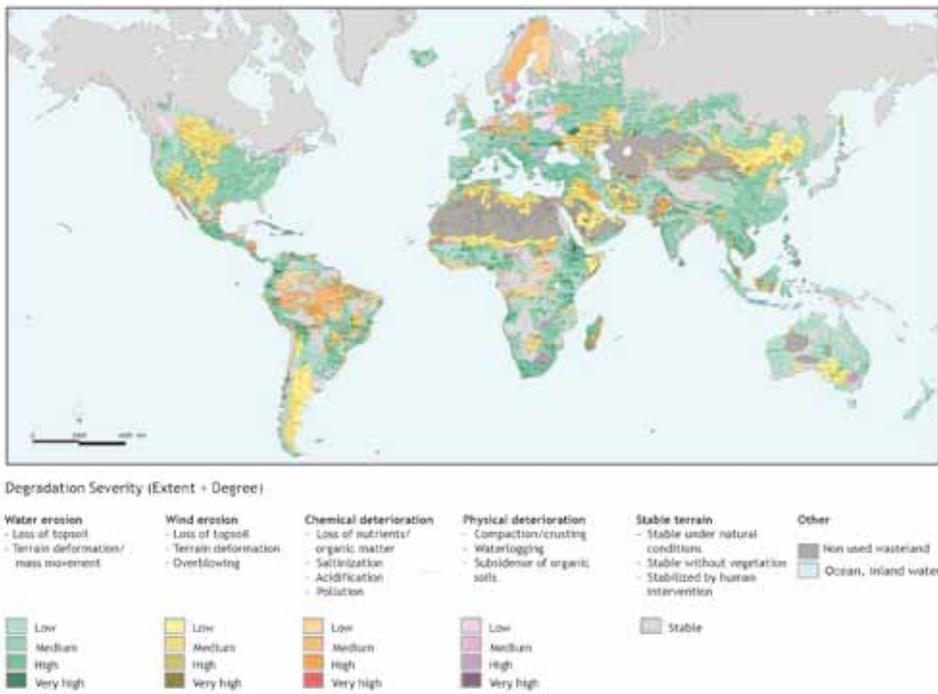


Figure 2.6: Global assessment of the status of human-induced soil degradation (1990). Source: <http://www.isric.org/projects/global-assessment-human-induced-soil-degradation-glasod>.

in Africa, affecting 65% of cropland areas, compared with 51% in Latin America and 38% in Asia (Molden, 2007). Land degradation, coupled with impending shortages of artificial fertilizers, in particular phosphate, further exacerbates the challenge of increasing food production.

So we have a paradox that requires us to grow much more food with the same amount of water or less, whilst causing less environmental damage. In physically water scarce regions, this means that intensification of food production and increasing water productivity in poorer countries are vital challenges. The following sections look at how this paradox may be overcome.

2.4 Solutions

There have been plenty of suggestions regarding what has to be done to facilitate the production of enough food to feed the world in 2050, although less attention has been devoted at national and international policy level to ensuring availability of water resources. With respect to food security, the FAO Expert Consultation held in 2009 set out a number of prerequisites. These included:

- Enhancing investment in sustainable agricultural production capacity and rural development
- Promotion of technology change and productivity growth, and
- Better use of trade, markets and support to farmers

If we accept the assumption based on economic and foreign trade grounds that much of the food required must be grown in the developing countries, then the above actions present a considerable challenge. Since 1980, the proportion of overseas development assistance to agriculture has dropped from almost 12% to less than 5%, whilst total ODA has increased about fivefold. Similarly, investment in research and development in the CGIAR has stagnated. The average annual rate in cereal yield growth has declined from 3.2% in 1960 to 1.5% in 2000. Exacerbating these factors was the 2007-2008 food crisis which saw a further 68 million people drop below the poverty line as a result of higher food prices in the poorest developing countries. Many authoritative scientists and commentators consider that the factors that led to the 2007-2008 food crisis are still not far below the surface and that the world will see recurrences of similar and probably more severe crises within the next 10-15 years.

Whilst there is significant concern about the recurrence of food crises and many countries are looking at their own food security issues, one response has been “land grabbing”, predominantly in Africa by Middle Eastern and North East Asian countries. Whilst the ethics and arrangements whereby this has taken place still require further scrutiny, little attention has been devoted to the impact that such grabbing of arable land will have on water resources. At the same time, densely populated countries such as China and India, with limited options for expansion of arable land, are seriously contemplating how they can intensify their own agricultural production systems.

Whilst food production and the availability and scarcity of water resources are inexorably linked, the remaining focus of this paper will be on examining how we must not follow a business as usual pattern in water management if food production targets are to be met.

2.5 Adapting to Challenges

Chartres and Varma (2010) describe six actions required if we are to overcome water scarcity and associated issues at global level. These are:

1. Better water measurement
2. Water governance systems reform
3. Agriculture needs to be seen as part of the environment
4. Revitalisation of agricultural water use
5. Better management of urban and industrial demand
6. Empowerment of the poor and women in water management.

In a sense, they all are interrelated. Better water measurement is needed because, put simply, “you can’t manage what you don’t measure.” In many countries, water governance systems including policies, institutions and regulation are outdated and heavily in need of reform if they are to be able to address and manage modern day issues. Whilst the European Union Water Framework has recognised the need to maintain and improve water quality, this is often not the case in many developing countries. Agriculture in many such countries is not seen as an integrated part of the environment that is responsible for pollution, but equally able, if managed better, to help maintain environmental and water quality. Revitalisation of agriculture in terms of increasing its productivity to deliver the required yields is perhaps the greatest challenge for water resource scientists and policy makers. If it is to be achieved, we need to see major upgrades of Asian irrigation systems including significant governance reform (Shah, 2009), a new and workable strategy for irrigation in sub-Saharan Africa, as well as major improvements in rainfed agricultural production. None of these can happen at the expense of the environment and none will happen unless we get the governance right. Hence the complexity and need for integrated approaches to not just water resources development, but to economic development in general. Whilst the majority of the action with respect to food production will be rural, it is important that we instil awareness in urban dwellers about the fact that water resources are finite. This requires industrial and domestic users to minimise unnecessary wastage and focus on recycling from home to city levels. Finally, given that many primary water users and farmers in developing countries are women and young people, we need to seek better ways to empower them in decision making and to provide access to new technologies, finance and other forms of assistance that historically are often primarily targeted at men. Similarly, as competition for water among users becomes more intense, we need to look at ways of both identifying and recognising the water rights of poor rural communities in order to protect their livelihoods.

To illustrate the integrated approaches needed in the future, three examples are given that focus on:

- Technology and Investment
- Incentives
- Governance

Technology and investment

Technologies that can have the most impact need not necessarily be the largest or the most expensive. The importance of dams, canals and large irrigation schemes in the challenge to improve food security cannot be denied, and much of the success of beating widespread famine in Asia can be attributed to irrigation infrastructure. However, knowing the environmental and social costs of large schemes, there has been a push to look at other ways to deliver, manage and conserve water. The proliferation of groundwater use due to the availability of cheap pumps is one example (Shah, 2009). Another is looking at the idea of water storage as a range of options from large dams and reservoirs, to small tanks and even counting water stored in soil. An understanding of the value of water storage, particularly by comparing the quantity of water per person per day in developed countries to developing countries paints a stark difference regarding the water security of people. In some African countries, storage is less than 50m³ per capita compared with values in excess of 5000 m³ per capita in the USA (Chartres and Varma, 2010). In the wake of climate change and climate-related disasters, increasing water storage in some countries and environments provides insurance against catastrophic disasters and can form the basis of a climate change adaptation strategy. Improving technologies and investment in water storage are important areas in which there is potential for great innovation, particularly with respect to low cost, easily up-scalable options at farm and field levels.

Incentives

Change requires incentives and/or the removal of disincentives. One of the biggest barriers to changing our understanding of water issues and practices of water use is the fact that for most of us, water is a free good. This means that there is little incentive to act in ways that conserve or use water more wisely. Experiences of attaching a cost to water, or attempts to value it have been successful in some places; however they do raise political and social concerns. The trade-off between development and conservation in the context of developing countries, where a large number of the world's poor reside, can lead to much harsher consequences. However, experimenting with second best solutions - ones that provide more realistic options - can produce results. In Gujarat, India, the massive proliferation of groundwater pumping, helped by flat rate tariffs on electricity and easy access to cheap pumps, started to cause a serious environmental problem in one of India's driest states (Shah et al., 2008). The Jyotigram scheme was initiated as a way to provide uninterrupted power to villages. Influenced by recommendations from IWMI (2009), the scheme divided and rationed electricity supply to farms in order to regulate the use

of energy in groundwater pumping (see also McCartney and Smakhtin, 2010). The regulation and separation of agricultural from the commercial and residential electricity supply had a drastic impact on the behaviour of farmers and subsequently on the extent of groundwater withdrawal. The example of this scheme illustrates how second best options can result in more implementable outcomes.

Governance

Water governance, or the process by which decisions about water allocation, use and management are made, is complex not least because of the widely held belief that water is a free good that should also be a human right. Rights to water use are usually divided and governed by institutions and organisations that represent different users or sectors. The management of water through different sectors that do not work together is a major challenge, particularly in conditions where water is scarce and competition for limited resources is strong (Wegerich et al., 2011). Also, sector-based planning limits an understanding of how to manage water along hydrologic principles within a basin or how to manage transboundary water. Many theoretical frameworks have been devised and experimented with to overcome the issue of sectoral segregation in water management, with varying degrees of success. In the Ferghana Valley, the three countries that fall within the Syr Darya basin, Uzbekistan, Kyrgyzstan and Tajikistan, have made significant progress in improving the management of shared water resources in a region where transboundary water is a highly political issue. A project funded by the Swiss Development Cooperation was first initiated to test and study the impact of new localised institutional arrangements for sharing water that would address conflict and aid cooperation at field and canal level. Water User Associations (WUA) and canal management organisations were introduced to the sites along the basin boundaries, in countries where there was no precedent for participation in such organisations – about 30 hydrographic WUAs (coverage: more than 37,000 ha; population of 300,000) and 300 Water User Groups on tertiary canals. More than 700 members of the local water management system, WUA specialists, farmer groups and other stakeholders were trained and equipped with appropriate skills and sufficient capacity to assume the management and governing of newly introduced participatory bottom-up institutions. The success of the initiative to improve cooperation and water management with the involvement of farmers has led to wider reform of the governance of water in the region. The new structure is being institutionalised and there has also been improved transfer of information and knowledge between the participating countries. Nevertheless, there are still political hurdles to be overcome between the national governments of the three countries regarding the establishment of an effective transboundary river basin authority.

2.6 Conclusions

Dealing with water scarcity will be one of the most critical challenges to be overcome if global food security is to be achieved by 2050. We will not be able to double food production over the next 40 years if we continue with business as usual. This paper has highlighted the need for

technological innovation, a better understanding of how incentives and disincentives can inhibit best practice management of water resources and the need for continued reform of institutional and governance arrangements. It has also stressed the fact that, because of the complexity of water management and agricultural production systems, there is a need for more integrated approaches to the development of solutions. It is doubtful whether more reductionist scientific approaches or individual economic sector approaches will be able to deliver these in the future. What is required is a new blue-green revolution that integrates technical, governance and social considerations for improved water management in an overall context of agricultural production systems.

Acknowledgements

I would like to acknowledge Ms Samyuktha Varma for her help in preparing this paper. I would also like to thank Kai Wegerich and his colleagues from IWMI's Tashkent office for the information presented on Central Asia.

3. AGRICULTURAL LANDSCAPES – CHANGE PATTERNS AND POLICY CHALLENGES

Jørgen Primdahl¹ and Simon Swaffield²

3.1 Introduction

Agricultural landscapes are shaped partly by their distinctive local socio-economic and natural conditions, and partly by the same and increasingly globalised external driving forces. They are fixed in space, conditioned by soil, water, topography, biodiversity, climate and local socio-economic structures and traditions, but they are also highly affected by factors such as technology, regional and global markets and different levels of policy. On the one hand therefore, agricultural landscapes become increasingly interlinked through more or less globalised changes, particularly those related to agricultural development and urbanisation. On the other hand, local conditions continue to be important in shaping the actual changes of the landscape, particularly the nature and availability of social capital.

In this paper, we discuss the changing agricultural landscapes in the context of globalisation and public policy. Referring to earlier works (Swaffield and Primdahl, 2006; Primdahl and Swaffield, 2010; Primdahl et al., forthcoming), we first address key change patterns occurring in agricultural landscapes, focusing on developed countries. Our main point here is that agricultural structural developments, urbanisation in a broad sense and local community actions should be analysed in combination if one wants to understand the overall change processes evolving in local landscapes. We then analyse the various public policy domains affecting agricultural landscapes and briefly describe key research and policy challenges as we see them. Finally and based on ongoing research, we present some components of an approach to landscape strategy making at local level.

3.2 Current change factors

Although we tend to carry an image of rural landscapes as stable, unchanging environments – as opposed to dynamic urban spaces (Williams, 1973) – they are in fact highly dynamic. Agricultural structural changes, linked mainly to technology and market (including market policy), represent a significant change factor affecting most rural landscapes. When food markets expand and technology is rolled out on a global scale – often through multinational corporations including agro-food chains (Morgan et al., 2007), agricultural landscapes become increasingly interlinked, as is everything else in the globalised world (Giddens, 1990). Three dimensions of structural change in particular are affecting agricultural landscapes: intensification of production (increase of input/output per hectare) or extensification/abandonment of farming; globalisation or localisation of production and consumption; and urbanisation in its different forms, including

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the migration of people from towns and cities into the country (counter urbanisation), both in the rural-urban fringe and across metropolitan regions. We discuss urbanisation in the following Section.

Intensification of farming practices through increases in input such as fertiliser/manure, pesticides, livestock density, labour, energy etc. per ha characterised agricultural developments in many parts of the developed world through the 19th and 20th centuries, partly driven by growing populations, market competition and production subsidies. Arable farming has expanded at the expense of wetlands, semi-natural grasslands, forests and natural habitats. New, improved crops and more efficient cultivation practices can be seen as part of such intensification processes which together have dramatically increased yields per ha (Evans, 1998). The consequences of agricultural intensification (together with parallel trends towards specialisation and mechanisation) have been immense with dramatic changes in biodiversity, water resources, soils, cultural heritage and the character of rural landscapes (Tilman et al., 2002; Butler et al., 2007). Public subsidies, tax reductions and other public interventions, especially after World War II, have stimulated the intensification of agricultural production.

Since the 1980s, two parallel and related developments have changed the conditions for further intensification. First the expansion of the food market through international trade agreements and the expansion of regional markets such as the EU have increased competition among food exporting countries, squeezing profit margins and strengthening the requirements of cost reductions and output increases (Goodmann and Watts, 1997; Marsden, 2003). Secondly, the reduction or decoupling of agricultural subsidies from production has changed the marginal conditions for areas to be farmed and reinforced the competitiveness of food production. Together these trends have reinforced the competitiveness of food production and thus farmers' motivation to intensify. There are signs that agricultural intensification will continue in areas with good conditions for agriculture.

On top of this, the new objectives (and associated subsidies) for increased biofuel production are contributing to more demands for the production of biomass. On the other hand, the demand for biofuel should be viewed in a context where the price levels for fossil oil, electricity and fertiliser (on which most agricultural businesses are highly dependent) are rising faster than food prices (Baffes and Hanjotis, 2010). This is not (at least not in the short term) reducing the pressure for intensification, but there is no doubt that the rapidly rising energy costs associated with crop production are complicating the future conditions for agriculture, including the competitiveness of different land uses.

In any case, the increased competition on the international food markets and the removal of subsidies mean that not all farmers can maintain their competitiveness. Some farmers are forced to either give up or to extensify.

Extensification of agricultural production refers to a process where input and/or output per land unit are reduced whereas marginalisation usually means a process by which the 'margins' for economically viable production changes and more land or types of production become unprofitable and may be abandoned. This means that the driving forces causing marginalisation (first of all relative increases of production costs in relation to food products and removal of subsidies) may be the same as the ones underlying extensification, although the latter may not lead to abandonment of farming.

The withdrawal of most subsidies to agriculture in New Zealand in the mid 1980s led to widespread extensification of agriculture in many types of landscape. Nonetheless, the vast majority of private land remained in agricultural production and agriculture has 're-intensified' in areas that have become more integrated within global commodity chains, notably dairy production (Primdahl and Swaffield, 2004; Swaffield 2010). In the US, agricultural production was both extensified and abandoned in areas with poor conditions for agriculture throughout the 20th century (Redman and Foster, 2008), and similar patterns have occurred in Europe (Meeus et al., 1990; Stanners and Bourdeau, 1995; Ilbary and Bowler, 1998; Wilson 2001).

However, the impact of agricultural marginalisation on rural landscapes and how these are perceived differ. In the new world, where agriculture often has a relatively short history and is dominated by introduced species, agricultural production may not be regarded as part of a valued cultural landscape, and natural habitats which were cleared to enable agriculture may regenerate relatively quickly after the abandonment of farming. Marginalisation of agriculture may therefore have a positive impact on biodiversity (see Foster et al., 2008 for figures from the north east of the US for example) and may be considered positive from an ecological point of view.

In the old part of the developed world, particularly Europe, agriculture – especially low input, family-based farming – is usually seen as a positive or even indispensable part of the cultural landscape. Moreover, significant biodiversity values are associated with extensive or 'high nature value farmland' (European Environment Agency, 2004). Semi-natural grasslands such as the salt marshes in the Wadden Sea, alpine meadows and silvo-pastoral systems such as the Portuguese 'montado' represent habitats that depend on extensive agriculture for their survival. Abandonment of farming in such landscapes may therefore be considered a threat to a number of values, and agri-environmental support schemes to maintain extensive farming practices have been implemented in Europe since the mid 1980s.

Globalisation, glocalisation, and localisation: As described above, agricultural production has conventionally been conceived as a spectrum ranging from intensive to extensive applications of inputs per unit area. The geographical source of the inputs has not been considered as unduly significant, and neither has the location of the consumption of the outputs. Globalisation has

both accelerated and highlighted the way in which technologies, energy, nutrients, markets, and frequently labour and even management may increasingly be more associated with distant landscapes than with the landscape in which production occurs (Primdahl and Swaffield, 2010). At the same time however, localisation (Cowell and Parkinson, 2003) is a reaction that is emerging particularly but not exclusively in wealthy developed countries, associated with movements such as organic agriculture and local food, focused on the local spatial integrity of food production systems. Such systems may adopt traditional labour intensive models, but are more typically based on high levels of information but low levels of nutrients and energy. Italy is a leader in promoting strong local connections between production and consumption, whilst the rapidly expanding organic agriculture movement is focused more on system integrity (Maittiacci and Vignali, 2004; Smeets, 2011).

A number of authors have questioned the simplicity of such distinctions between global and local scales (Sonnino and Marsden, 2006) and glocalisation (Swyngedouw, 1992, 2004), applied in a range of urban and cultural settings, including agriculture, describes the multiplicity of ways in which the relations between the global and local are being reconfigured geographically, both upwards and downwards in scale. The changing and frequently multiple scale relations within agricultural production is therefore a second critical dimension to be considered alongside questions of intensification and extensification.

3.3 Different forms of urbanisation

Urbanisation is normally understood to be the process of migration of people from rural, often remote regions into towns and cities. This has been a continuing process throughout human history and is still occurring throughout the world, although mostly in developing countries and former communist countries such as Russia (Zlotnik, 2004). For some landscapes, the disappearance of economic activities related to fishery, forestry and agriculture has resulted in a hollowing out of the social and community structures previously associated with rural landscapes, creating an increasingly impoverished and empty land. This is what has happened in large parts of European Russia (Ioffe and Nefedova, 2004) and in former communist countries now operating under market systems, such as Estonia (Palang and Printsman, 2010). In other landscapes, such as most of the former agricultural landscapes in Sweden and Finland, urbanisation has been running in parallel with marginalisation and has resulted in large regions being dominated by forest landscapes (Emanuelsson, 2009).

However the movement of people from cities into rural areas, often termed counter-urbanisation, may also be seen as a form of urbanisation. In this case, counter-urbanisation may be understood as a socio-economic urbanisation of rural landscapes, when people with urban incomes (or pensions developed from urban incomes) move into the rural landscape and manage their land more as a living place than as a production place. Counter-urbanisation generally occurs within

the rural fringe of urbanised regions, but is also evident in more remote regions, often in highly attractive landscapes. In large parts of the Alpine regions in southern Germany and Austria, for example, there has been significant population growth between 1990 and 2000 due mainly to counter-urbanisation (EEA, 2006, p.15). In landscapes where counter-urbanisation is occurring, commercial farming may already be under pressure due to the marginalisation processes described above, and its decline can be accelerated by rising land lifestyle prices and issues of reverse sensitivity (urban incomers objecting to rural production systems). This is the case in the rural part of the Copenhagen region, for example, where the number of full-time farmers has declined and their share of agricultural land has fallen to less than 10 percent, while hobby farmers with incomes outside the farm have grown proportionally (Busck et al., 2006).

The landscape consequences of these counter-urbanisation processes include – at least in recent decades – extensification of production expressed as a reduction in land in rotation, increases in grasslands and woodland, and a rise in recreational activities and growth of non-agricultural businesses associated with incomers. Over time, these landscapes become more and more urbanised in a socio-economic and cultural sense, even if they appear to be reverting to a more wooded, pre-agricultural habitat.

The long-term consequences of counter-urbanisation are more uncertain. In large parts of the north east of the US, agriculture had largely disappeared by the beginning of the 1960s, due to a combination of counter-urbanisation and poor conditions for farming. As a result, the landscapes have transformed into forest landscapes inhabited by urban commuters and pensioners (Gottman, 1961; Foster et al., 2008). Similar patterns can be seen in some parts of south-east England (Bohnet et al., 2003). However it remains to be seen what the long term trends will be for many parts of Europe and other densely populated parts of the world where urban centres adjoin better quality land which retains production capacity. It is in these regions with good conditions for agriculture – fertile, well drained soils and no difficult terrain conditions – that agriculture is competitive globally, and it is in these regions that we find high levels of investment in more or less industrialised agriculture. However, it is also often in these regions that major cities and urbanised regions are located – because it was agriculture which historically provided the background to the urban economy – and thus where urbanisation pressures are most intense too. In many developed countries, the more marginal areas for agriculture are often also relatively attractive mosaic landscapes, due to their historical legacy, which attracts some segments of the urban population. At the same time, it is particularly from the marginal and remote agricultural landscapes that people migrate to the city.

The change patterns described above intersect and may all occur parallel in time within the same landscape, although one of the trends tends to dominate in different regions. In Figure 3.1, we have illustrated how these trends can be seen together in a matrix composed of two gradients: land

suitability for agriculture and population density. From six case studies in three developed countries – Denmark, New Zealand and Portugal (Primdahl, 2010) – and two local Danish studies (Primdahl et al., forthcoming), we found indications that agriculture is intensifying in areas with good conditions and extensifying in areas with marginal conditions. We also found that urbanisation patterns including counter-urbanisation affects the landscape functions and patterns to a varying degree. If these findings can be generalised, we will expect intensification to occur mostly in the upper part of Figure 3.1, probably most in the less populated regions, i.e. to the upper left. Extensifications of agriculture are expected to take place in the lower parts of the Figure. Urbanisation in the form of migration to urban environments mainly takes place in the left part of the Figure, while suburbanisation mainly occurs on the right, as does counter-urbanisation.

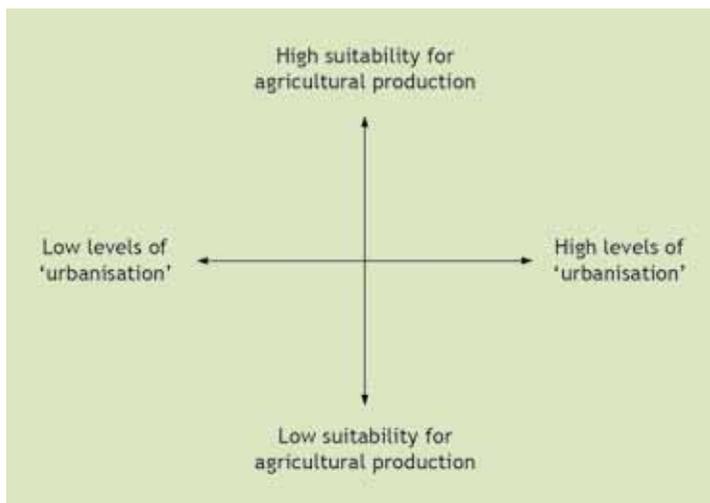


Figure 3.1: Two main factors influencing agricultural landscapes – agricultural suitability and degree of urbanisation measured as population density (Adapted from Primdahl and Swaffield, 2010, p. 7).

3.4 Changes from within – the significance of local community and new trends in agriculture

The primary agent in managing the agricultural landscape – the farmer – is naturally affected by the structural changes in agriculture and by various forms of urbanisation. However, this does not mean that the farmer does not have any form of autonomy and that he/she does not have several choices which he/she can make as a farm manager, either in the family or in direct cooperation with others concerning his/her production and his/her landscape. In fact it is these local visions and specific adaptations to the general conditions that shape and maintain the individual landscapes and thus the immense variations in patterns and character that characterise agricultural landscapes. As shown by Jones (1988, 1991), it is the concrete individual (many of which are based on common,

inter-subjective values) in combination with collective adaptations to the local natural conditions and structural patterns such as technology, market and legislation which make the specific landscape in question different from other landscapes.

At farm level, van der Ploeg et al. (2008) distinguish three ways of using local resources in an economic development strategy: by deepening the traditional food production and thus generate added value to production (converting from conventional to organic farming, for example); by broadening farming activities (to include habitat management supported by agri-environmental support schemes, for example), and by re-grounding (by using former agricultural buildings to new purposes, for example). At community level, van der Ploeg et al. (2008) use the concept 'rural web' to describe the specific local conditions for rural development. This is understood as a multilayered network or "...set of internally and externally generated interrelationships that shape the relative attractiveness of rural spaces, economically, socially, culturally and environmentally" (Marsden and van der Ploeg, 2008, p. vii). According to this definition, the way in which the agricultural landscape is shaped, maintained and changed is determined by this 'rural web' – which should neither be seen as the 'product' of structural conditions nor as an independent driving force 'producing' the landscape, but rather as the networked intersections of socio-economic structures, acting agents and natural conditions (Murdoch et al., 2004).

In a situation where local rural communities are increasingly competing to attract newcomers (or just to maintain existing population) and the associated economic and social services, initiatives to develop, maintain and protect landscape values are crucial. However, as current social demands relating to rural landscapes are different today than they were 50 years ago (when agriculture dominated most rural communities both culturally and economically) and often more complex and multifunctional, there is a need to develop models – both institutionally and specific physical patterns – for such future landscapes.

Such models, including new forms of governance and new strategic approaches to rural landscapes to address these challenges, are discussed at the end of this paper. Firstly, we take a more global view of public policy in relation to agricultural landscapes.

3.5 Policy frameworks in change

The immense diversity in European landscapes is partly due to former structural conditions, including quite localised regulations of markets and property rights as well as more isolated use of technology. Today there is an open European market for almost all commodities including food and the land market has also been opened to everyone, with a few exceptions. New technologies and their practical use in mainstream agriculture are now unfolding much faster than was the case just a few decades ago. These developments have had and still have huge consequences for European landscapes (Stanners and Bourdeau, 1995).

At a global level, two policy agendas are of particular interest with regard to agricultural landscapes, the market policy agenda and the sustainability agenda (Dwyer and Hodge, 2001; Primdahl and Swaffield, 2010) (Figure 3.2). Two recent developments have characterised the first agenda. Firstly, this agenda has been increasingly centralised through the internationalisation and convergence of market policy paradigms and the expansion of trade agreements. Most important here is agricultural policy, which for EU member states primarily means the Common Agricultural Policy (CAP). The CAP has largely replaced the national agricultural policies by a common policy and in recent years – as with the US agricultural policy (and many other state policies) – has (partially) adapted the agricultural policy to WTO requirements of de-coupling the support measures from production.

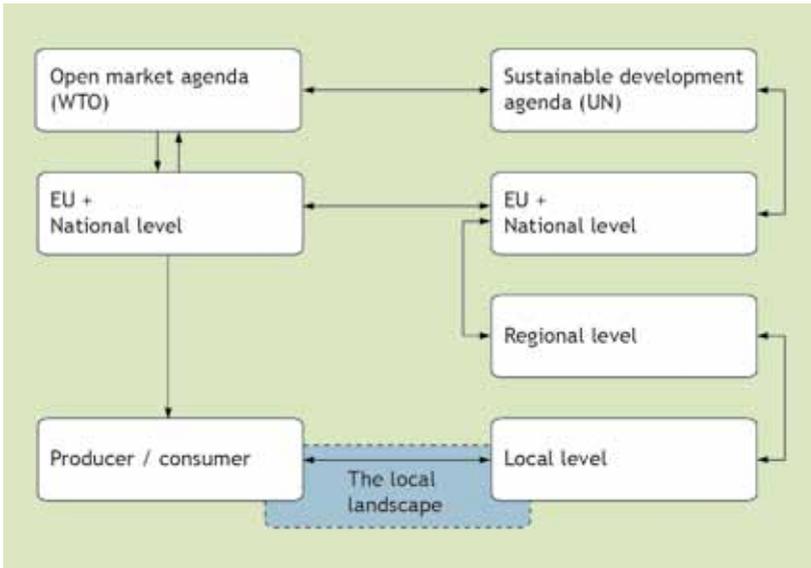


Figure 3.2: Two international policy agendas affecting the local agricultural landscape: the open market agenda and the sustainable development agenda (Primdahl and Swaffield, 2010, p. 10).

Secondly and related to this, agricultural policies (and other market policies too) have been de-regulated, meaning that they contain fewer or no regulations on traditional agricultural policy issues such as acquisition rights (to farm land), size of farm units, tenancy and leasing regulations etc. This was the case for the Danish Agricultural Holdings Acts, and was a distinguishing feature of the radical reform of New Zealand agriculture as part of wider socio-economic change in the 1980s (Dalziel and Lattimore, 2004). To summarise, these developments mean that there is a very long way from decisions made within the CAP for example (and even longer for the WTO), and the individual farm.

However deregulation does not mean that the new centralised decisions do not have local consequences. In terms of changed conditions and the associated gains and costs, in principle there is no difference in deregulation or regulation. Two examples may illustrate this. When the first stage of reforming the CAP was implemented as the so-called McSharry reform in 1992, price guarantees and export supports were largely removed and replaced by much simpler and partly decoupled hectare and headage premiums. In addition, set aside rules were introduced to reduce surplus production. To start with, 12 percent of land with so-called supported crops (over 17 ha) should be set aside. This percentage was subsequently changed every year as a form of (market) response to the degree of over-production. In economic terms, it was quite simple and effective (over-production disappeared). However, the varying set aside requirements (in operation from 1992 to 2008) meant that field boundaries throughout the European continent changed every year, and the replacement of production subsidies by direct payments favoured owners of farmland at the expense of producers – two effects which both have significant landscape consequences.

The other policy agenda, which has been termed the sustainability agenda (Dwyer and Hodge, 2001) represents the policies related to sustainable development, such as environmental policies, spatial planning, and rural development programmes. The Brundtland report from 1987 (World Commission, 1987) and the Rio Conference in 1992 represent two significant early landmarks in the development of this agenda into an international policy agenda (Clapp and Dauverge, 2005). The UN's programme for sustainable development constitutes the key international institution and it is a characteristic of this agenda – as opposed to the market agenda – that it is very much alive on all political-administrative levels, from international programmes to the municipal planning office.

The two agendas are naturally closely and increasingly interrelated, as it was mainly the shortcomings or one-dimensionality of market policy which led to the Brundtland report, and vice versa: many sustainability issues involve or require market responses. It is also inevitable and universal that the consequences of policy decisions in the two agendas meet in the local landscape (Primdahl and Swaffield, 2010), as indicated in Figure 3.2. A crucial factor in determining the functional outcomes of this meeting noted in several places in the Brundtland report is the extent and success with which the two types of policies are integrated in different landscapes and contexts.

3.6 Challenges

Against the background of this framework of two policy agendas and the different types of changes outlined above, we have identified a number of policies, practical and research challenges and opportunities facing the future development of agricultural landscapes in a globalised world (see Swaffield and Primdahl, 2010). Here we emphasise three key challenges across scales of policy and action.

Firstly, there is a clear need for analytical models linking local rural agency with deliberative governance, and a wider strategic public interest. While the two conceptual models presented here (Figures 3.1 and 3.2) may be helpful in understanding relationships and overall change patterns, more pro-actively oriented models are required for linking policy objectives to action in regional or local contexts with specific conditions for change (and protections too), and with a wide range of agents with different stakes. The strategic approaches developed and successfully applied to guide changing urban regions (Albrechts, 2006; Healey, 2009) seem promising sources of inspiration for such models. In the final section, we return to such strategic approaches to rural landscapes.

A second problem concerns practical ways of articulating and combining the production-based environmental quality management that is increasingly undertaken within the corporate space of flows, with the local territorial management and conservation of place. This is a particularly urgent challenge for policy integration, especially concerning the linking of WTO trade policies with environmental and social objectives within the sustainability agenda. When policy objectives linked to large scale issues such as climate change (see for example Stavins (1997) for a discussion of possible instruments to limit CO₂ emissions), or regional watershed management (see Nassauer (2010) for a discussion of measures to reduce nitrate losses in the Mississippi basin) are implemented, this always happens in local landscapes. The challenge is to design general measures that can cover large territories and at the same time be so flexible that they can be applied and adapted by communities to specific landscape contexts. This challenge is particularly evident in regions where farming is intensifying, such as regions with good conditions for agriculture, and at some distance from urban centres (upper left part of Figure 3.1). Combinations of well designed landscape service measures (Termorshuizen and Opdam, 2009), joint assurance schemes (linked to certifications for example) and a local policy body capable of providing advice as well as controls may represent pathways to resolve this challenge – but in practice there are no easy solutions.

A third and equally urgent challenge in the context of globalisation is to respond to the marginalisation of agricultural landscape as a consequence of more open markets and removal/decoupling of agricultural support, and outmigration from peripheral regions to urban centres. The two processes may be interlinked, as described above, and may turn regions into a vicious circle of population loss, decline of public and private services, more out-migration and so forth. Furthermore, increased risks of soil erosion, loss of biodiversity and wild fires are often associated with agricultural marginalisation. Rural development programmes to reduce the risks of such negative socio-economic and ecological impacts may be a solution which could also link to some of the opportunities for development that may be in place (especially in attractive landscapes) for tourism, special food products (wine, olives, high quality meat and dairy products etc), and in-migrating urban people. Such landscape contexts can be found in the lower left corner of

Figure 3.1. The challenge is to mobilise resources including social resources in formalising and implementing integrated strategies and to develop a spatial planning practice to support such strategies.

Urban fringe areas express a fourth nexus of policy and practical integration challenges, where glocalisation processes intersect particularly sharply with the market and sustainability agendas. In these settings, there is a need to develop spatial policy frameworks that can sustain economically viable agricultural production (and thus an open agricultural landscape), whilst conserving environmental quality and recreational accessibility at a local scale, all in the face of urban population and land market pressures. Smeets (2011) illustrates some possible outcomes of this combination of needs within the densely populated society of the Netherlands, in which highly specified land use planning and management allows the development of tightly organised estate type arrangements to deliver a range of functions. Yokohari (2010) offers an alternative paradigm in Tokyo based on small scale partnerships between farmers and urban pensioners. However, these two examples are far from mainstream situations. In most urban fringe contexts, the physical planning systems and land use regulations are designed to deal with development controls (Millward, 2006) such as zoning systems (as in Germany, Scandinavia and the US) or Green Belt systems (as in the UK) (Hall, 2002) and not with agricultural sustainability. Moreover, the agricultural policy systems do not address the changes caused by urbanisation. In fact agricultural economic developments are regulated through the market policy agenda, whereas land use changes affecting agriculture are addressed in the sustainability agenda. When these two agendas meet in the urban fringe, there is typically very poor integration of objectives and instruments.

3.7 Building blocks for an integrated strategic approach – to policy and to research

In a situation where market policies are being centralised and planning systems are being decentralised, conditions for integrating the two agendas on a landscape scale do not look very promising. There are – for the reasons given above – many problems which must be resolved before a ‘landscape policy approach’ capable of dealing with both agricultural developments and social demands for well functioning and attractive rural landscapes in various regional contexts is achieved. As a kind of conclusion, we will suggest, in rather general terms, two possible ways forward.

Firstly, there is the idea of the rural web developed by rural sociologists and geographers (see van der Ploeg and Marsden, 2008 for several papers on this). This web of ‘relationships’ is characterised by six dimensions which may serve as an analytical framework for the conditions of rural development specific to the region in question (van der Ploeg et al., 2008, p. 7-11) – or applied to the context of this paper: for development of (specific) sustainable and multifunctional agricultural landscapes. Summarised and simplified, the six dimensions are: (1) endogeneity (the

opportunities for building on internal resources), (2) novelty production (potential for production improvements); (3) sustainability (especially restoration of economic sustainability); (4) social capital (the potential for acting collectively); (5) institutional arrangements (to coordinate and support cooperation); and market governance (organisation of supply chains). The idea of rural webs – and their elaboration – seems to be highly relevant in the context of landscape policy analysis, although moderations may be helpful. Thus, it may improve the relevance of the ‘rural web approach’ to agricultural landscape context if the structural, functional and character aspects of the landscapes are more explicitly addressed in the first three dimensions mentioned above.

Secondly, there is the framework of spatial strategy making – developed to deal with urban development strategies in an uncertain and highly dynamic world (Healey, 2009). This offers some approaches which we feel could be adapted for rural landscapes. In particular, Healy’s four dimensions of spatial strategy making can be applied to a regional as well as local landscape context: (1) creating a broad interest for a common strategy among very different stakeholders and agencies; (2) Scoping the situation – where are we and where do we want to go with what consequences for whom?; (3) mobilising resources needed for strategy, particularly knowledge resources – internal as well external in relation to landscapes in question; (4) framing the strategy through an overarching idea.

The real challenge (and the real opportunity) for better integration of market policy agenda and the sustainability agenda consists of combining the two approaches – finding ways to integrate spatial strategy with multi-layered networks – within a dynamic situation.

4. FROM LOCAL TO GLOBAL – ON SOCIOCULTURAL AND GOVERNANCE ASPECTS OF THE ORGANISATION AND SHAPE OF OUR WORLD

*Hans van Ginke*¹

4.1 Introduction

Humankind has come a long way. Although history has known many great empires in China, Southeast, South and Southwest Asia, the Arab world, the Americas, sub-Saharan Africa and Europe, for most of the time people were mainly, if not only concerned with the organisation of their own farmsteads, villages, towns and surrounding areas. They were trying to improve overall living conditions and maintain security, primarily in their direct living environment. In recent centuries, the modern state gradually became the most important institution to ensure progress, by setting the conditions and regulations that promote economic development, and improving the standards of education, health-care, housing, etc. Maintaining a peaceful living together of population groups from sometimes very different backgrounds was one of the major tasks of any government. In many countries on all continents, there is still much to do in these areas. However, now that we have entered the 21st century, humankind has become increasingly concerned with the future organisation of the world, which should ensure such world order goals as peace, social justice, human rights and democracy – in short, human welfare as well as well-being.

The falling apart of states like the former Soviet Union and Yugoslavia, the increasing fragmentation of the world political map and ‘failing’ states, like Somalia, all contribute to increasing concern that these goals will not be achieved in the foreseeable future. Some see the United Nations as the way out of all problems, as the institution par excellence to be empowered to attain the world order goals mentioned. Others are not prepared to delegate so much authority and power to a world organisation that has an ‘unpredictable decision-making process’, a world-government-to-be that does not have the necessary credibility. They do not realize that it is unlikely, if not impossible that there will ever be a ‘world government’, but that the development of a world governance system is already well under way. This system will have organisations such as UNESCO, WHO, FAO, UNEP, WTO, etc. as their ‘ministries’ of education, science and culture, health, agriculture, environment, economic affairs, etc.

The coordination between these ‘ministries’ at the global level, however, is even more difficult than it is between ministries within one state, as each of these worldwide organisations has its own, specific intergovernmental arrangement. Of course, such a system would work well

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only as long as it observes carefully the principle of subsidiarity. As states will continue, for the foreseeable future, to be the main layer of authority in the territorial administrative structure of our world, between the local and the global, it will be absolutely crucial that 'larger and greater bodies should not exercise functions that can be carried out efficiently by smaller ones'.

In the meantime, a strengthening of regional cooperation between states in different parts of the world is gaining momentum; think of the EU, NAFTA, Mercosur, African Union, APEC, etc., and at lower scale levels ASEAN, ECOWAS, SADC, CARICOM, ECO, etc. Some see this as a threat to future cooperation on a global scale; others interpret this tendency in a much more positive way as an essential step towards promoting multilateral cooperation, eventually at the global level. In their view, regional cooperation and eventual integration at different scale levels are essential steps towards bridging the very different realities at the local scale with the unifying tendencies at the global scale.

We can also observe tendencies that seem to go in the opposite direction, namely towards the independence of sub-national regions with ethnic, religious and/or socio-economic characteristics that are different from those of the major part of the country, as we could observe in particular in the former Soviet Union (e.g. the Baltic and Central Asian regions) and the former Yugoslavia. The confusing governance structures and processes in Belgium have been with us much longer. This process risks becoming endless, as the splitting off of territorial entities tends to create new minorities, as is quite clear in the case of Bosnia-Herzegovina or Kosovo, for instance. From this point of view, the multilayered territorial administrative reality of our world, between local and global, looks like a matryoshka – a Russian nesting doll, which is a set of wooden dolls of decreasing size and with different characteristics, placed one inside the other. The splitting up into smaller states will also inevitably lead to new patterns of supranational regional cooperation, as we can observe now in the case of, for example, Russia, Belorussia and Ukraine or the Central Asian republics. Here, we can observe, rather interestingly, that decentralization at one level leads to centralization at a lower level. The same can be seen in Japan, where the prefectures and universities are getting more autonomy and responsibilities. The smaller, weaker prefectures and universities respond in the same manner, by merging in order to be strong enough to meet the requirements that go with more autonomy.

Now, a decade into the 21st century, we are increasingly confronted with the question: what will the world look like in ten or twenty years from now? How will it be organized? In this paper, I analyse the trends, problems and opportunities in the organisation of the world and come up with some suggestions. After a long period in which it focused more and more on specific structures and processes within countries, often at the local and sub-national regional scale, geography must increase its level of meaningful activities on topics at the scale of supranational world regions and the world as a whole. It is also time to remind policy makers of some hard geographical realities that cannot be ignored without negative outcomes.

4.2 The state of our world

The business of the world has changed almost beyond recognition over the course of the last half century. It took only five decades, but the change is mind-boggling and has enormous impacts on almost every aspect of daily life. There are many more actors in our world today; the patterns of their activities and interactions are ever more complex and we must continuously take into account all of them. The locus of power and influence is shifting. People's demands on and expectations of governments, international organisations and civil society can no longer be satisfied through isolated and self-contained efforts. The international policy making stage is increasingly congested as private and public non-state actors jostle alongside national governments in setting and implementing the agenda for the medium and long term. A multitude of new actors adds depth and texture to the increasingly rich tapestry of international civil society. At the local, regional, national, international and global levels, we find next to each other governmental institutions, public services, associations, industries, trading companies, educational institutions, etc., as well as those universities that have become increasingly entrepreneurial in their behaviour, such as the Wageningen University and Research Center. All these institutions have their own patterns of behaviour, their ambitions and goals, their activities and interactions. Some fit quite well together, while others do not.

In today's world, political frontiers have become less salient both for governments – whose responsibilities within borders can be held up to international scrutiny – and for international organisations, whose rights and duties extend well beyond their original borders. This is also true for companies and public institutions, whose activities have expanded far beyond their local, regional and even national borders. The trend towards the certification of all kinds of products illustrates this point. Increasingly, it must be guaranteed that products meet specified requirements; for instance, that they will not cause any harm and/or that they have been produced in a sustainable manner. The legal and financial consequences of the collapse of the oil platform in the Mexican Gulf and of the oil-extraction related pollution of part of the Nigerian coastal area are other examples. In the world of higher education, various systems of quality assessment, accreditation and exchange arrangements have been developed in order to facilitate international cooperation, interaction and competition so as to guarantee the integrity of the system.

This is a world characterized by its large cities and agglomerations and the major private and public institutions that operate from them, and by a hierarchical system of nodes of financial and economic power and their global transport and communications networks. They cumulatively span an increasingly interconnected and interactive world, characterized more by technology-driven exchange and communication than by territorial borders and political separation.

Forceful geo-economic and geopolitical processes are rapidly changing the face of the earth. We are increasingly confronted with the modest size and limited resources of our planet. Our world is not only small, but also increasingly wired and interconnected. Many of us are

in almost daily contact with many different institutions and people in many different places, and on many different geographical scale levels ranging from local to global. Strong, worldwide, continuous competition seems to lead consistently to a shake-out in all sectors of life and society. In each sector, the number of major players seems to be ever smaller, and their size and power ever larger. Even states and countries have actively engaged in this process. Figure 4.1 gives an excellent impression of those parts that are actively involved, as well as those that are more or less excluded. Those lagging behind have an increasingly difficult task to catch up. Leapfrogging seems to be the only solution – but how to do that? Knowledge is the basis of all sound, sustainable development – but how to make knowledge benefit developing countries in a situation where the allocation of financial resources to scientific research is usually less than 1% of their GDP, compared to 2-3% in developed countries? This does not even take into account the huge differences in per capita GDP. Research expenditures per person in developed countries is 220 times greater than in the developing world. This extremely skewed distribution of scientific capacity generates serious problems not only for the scientific community in developing countries, but also for development itself. It accelerates the disparity between advanced and developing countries, creating social and economic difficulties at both national and international levels, rather than closing or bridging the gap between them.



Figure 4.1: A look from space at our planet Earth during the night: a clear illustration of the fact that we are moving towards a World of Nodes, Channels and Flows. Source: NASA.

With the increasing scale of privileged markets, globalisation and regional integration have exacerbated the problem. The development of the European Union illustrates this very well: from the pioneering six to today's enlarged European Union, which has brought together no

less than 27 previously divided countries. Subsidies make it possible for Europeans to sell their products on local markets in developing countries considerably cheaper than local farmers can. In fact, all round the world we now see regional integration aimed at strengthening economic opportunities and guaranteeing security. Much can be learned from the experience in creating 'Europe'. However, in Africa and Asia both the players and the conditions are different. How can we ensure that the African Union can contribute substantively to a strong and prosperous, united 'Africa' while maintaining its diverse nature and important multiple identities? Even ASEAN+3 will not lead to such a thing as an 'Asian Union', which will most likely never be created.

The populations of the domestic markets of China and India are already well above 1 billion each, those of the European Union and NAFTA are less than half that, and the domestic market of Japan is only 128 million. The competition for influence in the South – in Latin America, Africa, South and Southeast Asia and even the Pacific – is already well under way. The Middle East and Central Asia have increasingly also become involved in the process. Japan in particular has engaged itself very actively in finding partners for free market arrangements in Central and South America, Southeast Asia, Africa and recently even in Switzerland and Norway. China, too, has also shown very strong interest in both Africa and Latin America. Knowledge and knowledge transfer are becoming ever more important aspects of this trend towards expanding markets and cooperation. In our country, the Netherlands, institutes for international higher education – such as the IAC in Wageningen, the ITC in Enschede, UNESCO-IHE in Delft and the ISS in The Hague – have always played an important role in the development and transfer of knowledge worldwide, and in particular to developing countries. At present, it is too often forgotten that doing this has always served the well-understood, medium- and long-term self-interest of the Netherlands itself. After all, strong efforts to find strategic partners, particularly in trade, comprises increasingly well-understood self-interest that is a part of longer-term, economic and political strategies. The aims are to promote trade, develop new markets, broaden the base for joint ventures, influence international migration patterns and to further the UN goals of bringing about peace and progress. It also underlines the fact that we live in one world, characterized by its high levels of inter-connectivity.

Our future will certainly be a shared, a common future. Any important event in one place tends to have major repercussions elsewhere. For instance, violence or other disasters inevitably send streams of refugees in many directions and may have important economic and financial consequences round the world. Knowledge and, in particular, people with knowledge, will be decisive for the quality of our shared future. But will we treat knowledge as only an 'economic activity' and people with knowledge just as 'labour' within a free market economy? Or do we want to promote strategies in which we help talent round the world to develop and benefit their societies in more even ways? If so, we must develop strategies and technologies to address issues and problems on the spot, and promote tailored development activities that are adapted to specific circumstances. This offers excellent opportunities to experts in the 'Land & Water Network'.

4.3 Processes shaping our world

Humankind is going through a period of profound change in an increasingly interlinked world. One can distinguish five core processes that are leading to profound changes in the working conditions of institutions at all levels of geographical scale. Form and function are directly related: when functions change and the way of functioning is changing, the form(s) will also change. Thus, as a result the expression in our landscapes of these institutions and their positioning in the spatial organisation of our world is changing. In fact, our world is changing rapidly at the landscape and regional levels, as well as at all other scale levels.

Globalisation and localisation

Globalisation has become an increasingly complex concept. However, it is important to realize that it is not a new process. Many people think that globalisation has been around only for the last decade or so. This, of course, is not the case. We only have to think of the Huns coming to Hungary or of merchants travelling across trade routes like the Silk Road. Yet the question is whether the globalisation we are experiencing now actually represents something different. It would seem that there is a tremendous difference in both the scale and the pace of the globalisation process. The principle difference is that the impacts of globalisation are being felt simultaneously in places across the entire globe. It is this simultaneity, combined with the speed, that differentiates globalisation as we know it today from the foreign influences of earlier periods.

Modern information and communications technology is the key to the present state of rapid and profound change. In the past, the exchange of ideas required our actual physical displacement, and meeting people could only be achieved at a single place and at a single time. Now, however, we can interact with many different people in many different places round the world at the same time. The major element of globalisation is in fact the shrinking of distances. The whole concept of distance has changed in character over time, as clearly explained by F. Braudel, a major exponent of the Annales – the French school of historians and social and economic scientists. In his magnificent book on the Mediterranean world in the time of Philip II, Braudel (1972-73) focused on the pace and scale of that age. He demonstrated that over time, the concepts of space have altered in value. He did so by making a comparison between the time needed for a letter mailed in Venice to arrive in London in those days (at least two weeks) and in these days (a few hours, if sent by express). Today, by using email, we can send our messages simultaneously and instantaneously to many places round the globe. Thanks to modern technology, we can maintain continuous and simultaneous contact with many places and people, and as a result of this shrinking of distances, the frequency and volume of our contacts have in many respects grown, as have the frequency and volume of trade. Therefore, globalisation as we now know it is based on lower costs and the increased speed of the transfer of people, goods, ideas and money. Yet how this works out in concrete terms in the economy and in social and cultural life depends very much on the rules and regulations of the sector in society being considered: trade, development, health, culture, education, etc.

One of the most important effects of the shrinking of distance is that we are increasingly functioning at different levels of the geographical scale at the same time. One of the earlier scientific leaders of the Annales – the founder of the French school of human geography, P. Vidal de la Blache – introduced already in the 1870s the dual concepts of *vie régionale* and *vie nationale* (Vidal de la Blache, 1921; Claval, 1964). In those days, life at these two scale levels at the same time was completely separate. However, in our time, the number of geographical scales has expanded dramatically and many live at different levels concurrently. We can now live and act at a local, a provincial, a regional, a national, an international and/or a global level on the same day. Further, there are networks at each of these scale levels and, as opposed to other periods in history, people now regularly jump from one scale to the next on a daily basis (Castells, 1996). In fact, the major challenge facing all public and private institutions today is to link their activities and contact patterns at the different scale levels from the local to the global with each other in a positive manner. The rapid increase in the frequency and volume of our contacts and international cooperation all round the world have completely changed our opportunities and perspectives (see Figure 4.2).

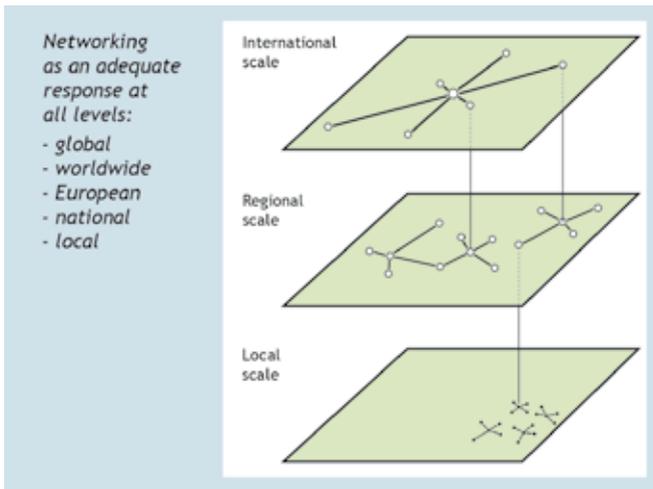


Figure 4.2: Interlinkages between Structures and Processes at different scale levels.

This has simultaneously led to ever stronger interest in the roots of individuals and the identity of communities and even nations. Alienation, losing grip on the global, leads in many cases to a strong reaction and greater interest in local developments closer to home, at the lower levels of the geographical scale. Globalisation is thus only one side of the coin, with localisation on the other (Figure 4.3). In fact, globalisation and localisation go hand in hand: glocalisation. Glocalisation is also directly related to the processes of integration and decentralization. This

means that while all institutions, including enterprises and universities, must increasingly compete at the international, macro-regional (e.g. European) and global levels, they also have to root themselves more strongly than ever in their local, micro-regional and national societies (van Ginkel 2003). It is becoming more and more a matter of balance and harmony between the presence and the activities at the various scale levels. Of course, deciding what the right balance is depends very much on the character of the institution and its activities.

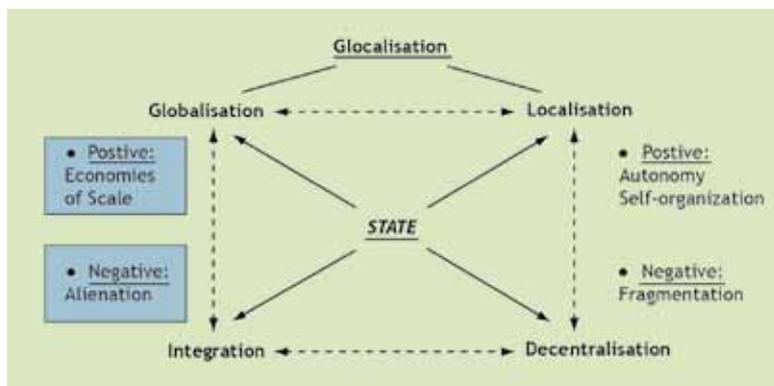


Figure 4.3: Consequences of glocalisation: core processes influencing public administration.

Development of the knowledge society

The increasing knowledge-intensiveness of society and of science itself is closely linked to the rapidly growing pace and space of our times. More and more knowledge is continuously being produced. Estimates indicate that the amount of knowledge now doubles in less than every five years. The 'shelf life' of knowledge is declining rapidly. American publications cited in the patent rolls in 1975, for instance, were eight years old on average, while only ten years later they were no older than six and a half years. It is becoming ever more difficult, and consuming ever more time, energy and equipment, to even arrive at the research frontier, let alone to participate in real breakthrough research. This makes it increasingly difficult for universities to perform at the level of global excellence. However, for all institutions, particularly high value-added industries, whatever their character, it is becoming more and more difficult, and at the same time crucial to acquire in a timely manner the best available, relevant up-to-date knowledge they need for their core activities.

Improved means of transportation, information and communication, however, have an influence far beyond economic cooperation through, for example, tourism and the modern media in the sociocultural, socio-economic and even the political domains. A loss of cultural diversity is widely seen as one of the negative effects of the trend towards globalisation. There is also increasing evidence of and fear for areas and people that in the process seem to be left behind, as well as for

the social consequences of the process (Figure 4.4). Solutions may lie in a different application of the same information and communication technology that is currently leading to harmonization. It will be important to look again at the mechanisms of the world economic and financial system in order to better address worldwide environmental and social concerns. UNEP, for instance, is campaigning for the development of 'green' budgets, and in South Africa, 'gender-friendly' budgets have already been developed. Former Vice-President Steglitz of the World Bank has been pleading for a renewal of the world's financial architecture.

<u>Differences in life expectancy</u>		
	<u>Ten richest countries</u>	<u>Ten poorest countries</u>
1998	78	45
<hr/>		
	<u>Japan</u>	<u>Malawi</u>
2002	81	40

Figure 4.4: Unintended consequences of globalisation.

In line with these developments, average levels of education are also rising. The whole concept of education is shifting as a result of this knowledge intensification (Etzkowitz, 2000). Multiple careers and learning throughout the course of one's working life will play an important role here. As a consequence, the profile of the student population as well as the learning styles and study programmes of schools and universities must change fundamentally. Internal organisation and external presentation will have to follow. Networking, both nationally and internationally, is needed to be able to provide an adequate response to all of these challenges. It is therefore increasingly crucial for all public and private institutions to develop innovative human resource management and development strategies. They must also relate more closely and positively to the educational institutions that are relevant to the quality and qualifications of their personnel throughout their professional life.

Education and science have to contribute to ensuring that the next generations of locally rooted but well-informed global citizens are capable of jointly ensuring peace and progress – the ultimate aims of the UN. Those working in agriculture are no exception to this general trend and are increasingly becoming part of an international system of production, marketing and consumption. Good academics have always pushed back frontiers and crossed borders, not only in the sense that the limits of human knowledge and ability are expanded, but also in the sense that political and geographical borders are continuously bridged. As increases in scale and globalisation progress further, along with the knowledge-intensity of our society, we need not only good academics but also citizens, who should

be adequately prepared to contribute to bridging frontiers in order to create a better future. Experts in the field of 'land and water' in the Netherlands have a long tradition of high quality and working internationally. They, in particular, have to continuously keep in mind these combined effects of localisation and the rapidly increasing knowledge intensiveness of their work.

Growing importance of ethics and values

A third process that has a profound impact on the common future of our societies and the world community at large is under way. Broadening understanding (Figure 4.5) to create a better future for all will be essential for achieving peace and progress in a world that, as a result of both horizontal and vertical mobility, is increasingly characterized by a variety of rapidly changing kaleidoscopic societies and communities. Here, we understand peace as far more than just the absence of war between states and as including the absence of civil strife and violence within states. In positive terms, it means the growth of a culture of peace, and the prevalence of tolerance and harmony.

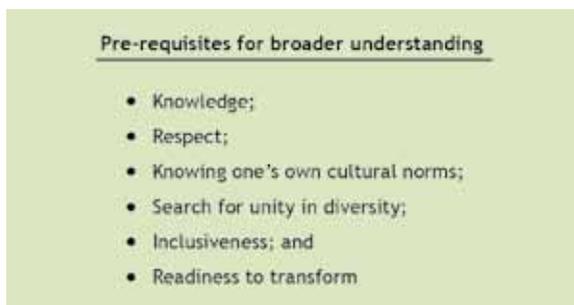


Figure 4.5: Creating a capacity for understanding.

Achieving such peace is not an easy or straightforward task in an increasingly complex world and global society. Many new dilemmas and paradoxes have arisen, sometimes precisely as a consequence of economic, scientific and technological progress – new issues that, themselves, create confusion and tensions. We are increasingly confronted with questions about the direction that our society and in particular its education and science must take on a number of crucial issues: bioethical and biomedical dilemmas, biodiversity and biotechnological questions, climate change and environmental degradation, access and benefit-sharing, legal and equity issues, and the social and cultural aspects of our interconnected world.

One of today's major issues is cultural diversity. In our diverse and intensely interconnected world we have many neighbours, nearby and far away, neighbours who often come from very diverse backgrounds. The strong development of international activities and relations is needed more than ever. At the same time, this presents the true internationalization of all institutions and their workforce,

including university campuses, with the challenges and opportunities of cultural diversity in a very immediate, direct way. In such circumstances it is essential to increase and improve knowledge and information about other people, cultures and societies. To achieve this, one must be prepared to engage actively in dialogue, unconditionally and with a truly open mind – not trying to ‘win’ as in a debate, but ‘trying to understand the other by listening carefully’ (van Ginkel, 2001).

Climate change and environmental degradation

It has been estimated that if we continue on the present course of development, humankind will soon need the resources of two or even three planets earth. That, of course, will be impossible. The urgency of the situation is illustrated by the fact that the 2007 Nobel Peace Prize was awarded jointly to the IPCC (International Panel on Climate Change) and to Al Gore, for his ‘Inconvenient Truth’. Together they succeeded in raising the profile of the issue and elevating climate change to the top of the political agenda of the world community. UN Secretary-General Ban Ki-Moon, for instance, made climate change one of the top two priorities for his term in office, acknowledging the need for both ultimate efforts to mitigate climate change and all-out efforts towards early adaptation. With all due respect to the proven capacity of the last two contributions to mobilize political support for the climate change challenge, I believe that the Millennium Eco-system Assessment has done a better job in bringing the challenges of environmental degradation and climate change closer to home, to the people (www.maweb.org/). By focusing its analysis on ecosystem services in a more detailed way for 33 different ecosystems, it has opened the way to understanding the real problems – the problems on the ground – and possible ways to address them: ‘Think globally, act locally’, but also the reverse, ‘Think locally, act globally.’

Our impact on our living planet – and not merely the climate system, as many seem to believe – is enormous, and the earth is continuously changing as a consequence. All the earth’s life support systems are under severe threat. Human activity often causes environmental disasters. Environmental risks have increasingly become the principal source of human insecurity. Of course, human communities will always face natural hazards such as floods, droughts, storms, volcanic eruptions or earthquakes. The sobering reality, however, is that today’s disasters are too often man-made and that human action or inaction exacerbates virtually all of them. Developing countries and the people living in them are suffering the most.

There is a clear relationship between poverty, environmental degradation and disasters. The term ‘natural disaster’ has increasingly become an anachronistic misnomer, so much so that the former UN Secretary General Kofi Annan in his 1998 Annual Report ‘Preventing War and Disaster: A Growing Global Challenge’ (Annan, 1999, p.4) stated that environmental risks and disasters, rather than war and conflict, were the main cause of human insecurity and that many of these disasters should best be called ‘unnatural disasters’. The climate is changing such that extreme weather conditions are becoming more and more frequent; soils are disappearing or

becoming polluted; forest fires are becoming increasingly frequent; groundwater tables are falling so drastically that good harvests are becoming ever more illusory; new infectious diseases emerge, and old ones reappear; some natural resources are becoming really scarce; etc. It is here that universities, specialized research agencies and enterprises must come in with their research, study programmes and services to assist society. 'Land and water' experts can make important contributions here.

Challenges are often also opportunities, and most changes can be both for the better and for the worse. The positives can also be negatives; the negatives, positives, directly or indirectly. While faraway environmental disasters that cause major financial damage and huge losses in terms of human lives (nearby, but often also far away) can shock and even frighten us, good can also be done over great distance. This has been demonstrated many times, when massive aid programmes were set up after great disasters, such as the tsunami in the Indian Ocean or the earthquake in Haiti. Those of us who enjoy life in an affluent society cannot ignore poverty, misery and disasters, whether they are near by or in poverty-stricken countries. We have to understand why such conditions occur and what we can do about them. Education for sustainable development, therefore, has a crucial role to play in securing a peaceful common future, a future in which all will benefit from improved opportunities and enjoy a better quality of life (van Ginkel, 2005).

Fundamental shifts in the balance between public and private

The present economic conditions as well as the development of the modern state are leading to a continuous reassessment of the responsibilities of both the state and the citizens. The ageing of the population seen in most countries, for instance, is leading to growing expenditures on pensions and health-care. The stronger participation of women in the labour markets calls for better provisions to take care of young children, also outside regular school hours. The greater participation in secondary and higher education places heavy demands on the availability of facilities and study opportunities, including the availability of sufficient numbers of good quality teachers, and so on. The expenditures on higher education and scientific research are among those public expenditures that are undergoing continuous and serious scrutiny. The question 'Who benefits most?' comes up increasingly often. Time and again, questions are asked about the extent to which students can take care of their own expenditures, perhaps through loans that could be tax deductible once they are earning their own money. In the same way, universities are being encouraged to find their own research money through contracts with industries or foundations, or in competition with other universities for funds from national or European grant organisations. As a Finnish minister of higher education once said: 'We have given the universities more autonomy to find their own money; to do more with less.' As a consequence, universities increasingly have to operate in much more entrepreneurial ways and to compete nationally and internationally (van Ginkel, 1999, 2005).

Universities are not the only institutions to be so directly impacted by this general trend, that is, to reassess the balance between public and private costs and expenditures. For instance, in the field of 'land and water' in the Netherlands, there is a fierce debate on the water management boards (Waterschappen). Development cooperation is one of the main areas that has suffered the most from this trend internationally. In the 1990s, the worldwide contributions decreased substantially. This was the main reason to focus the decision making at the UN Millennium Summit (2000) strongly on the Millennium Development Goals, addressing the three umbrella themes of Freedom from Fear, Freedom from Want and Sustaining the Future. By clearly quantifying the targets of the various MDGs, it was possible to create a new momentum and again increase the funds available for development. The outcomes of the World Summit on Sustainable Development (Johannesburg, 2002) helped to put words into action, through concrete but flexible partnerships of donor and developing countries, enterprises and NGOs focusing on the implementation of projects with regard to water and sanitation, energy, health, agriculture and biodiversity.

This shift in the balance between public and private expenditures has a great impact on the behaviour of both public and private institutions, on what governments do, and on what enterprises, associations and other NGOs and individual households and persons can do. This also has a great impact on production and consumption patterns, lifestyles, long- and medium-term investments, and the shorter term spending of money. This also has a direct impact on landscapes and the spatial organisation and expression of society on the surface of our planet earth, as we can already see in the Netherlands in the shifting policies on infrastructure and nature conservation, as well as those on urban and regional development or housing.

4.4 Interactions and changing landscapes

In this contribution, I started from a higher scale level than experts in 'land and water' usually do. Their work is generally focused on what can be seen at eye-level. This cannot be done very well, however, without taking into account what can be seen from a bird's-eye view. Water management projects must take into account not only the local, the here and now, but also the longer term development of rainfall, for instance, as well as the characteristics of river systems as a whole. From a governance point of view, it is equally important and interesting to look at the organisation of our world not only from a point of view of territorial administrative entities, such as villages, urban neighbourhoods or municipalities, but also at the level of provinces, states, international regions or even continents and the world as a whole. As I have indicated, structures and processes are related to each other not only within each scale level, but also between the different scale levels. When there is yet another period of extreme drought and hunger in the Horn of Africa, we see not only streams of environmental refugees throughout the region, but also concrete localities – where they come from, go through and take refuge – and support from outside the region. Taking into account the five core processes that are shaping our world today,

we can see five major developments over the last half century that have had a tremendous, often very direct influence on the spatial organisation of our world and the landscapes on the planet earth.

Decolonisation

The United Nations officially came into existence on 24 October 1945, as a result of the UN Charter being ratified by a majority of the original 51 Member States. There are now 193 Members. This enormous increase is especially the result of a very successful policy supporting self-determination and decolonisation. This positive development, however, was not always unproblematic. The former colonial empires had not paid much attention to the ethnic, cultural and geographic realities on the ground. After all, the new countries had to ensure their own future and that of their populations, different as these might be. In many places, the matryoshka dilemma popped up. In Nigeria, for instance, Biafra tried to become independent; in the Congo, this was the case with Katanga. Closer to the colonial heritage of the Netherlands: Aceh tried for a long time to become independent, and finally settled for a degree of autonomy. Before that, there were also efforts in the Moluccas and Sulawesi, for example, to achieve independence or at least autonomy.

The development of new, independent states does not always mean decolonisation in a formal sense. Nevertheless, we can observe even in Europe the same type of problem. In the former Yugoslavia, for instance, Slovenia and Croatia achieved independence through a relatively simple process. Bosnia-Herzegovina, with its three states and many cantons, presents a much more complex case. Kosovo is another illustration of the conflict between two principles of international law: the principle of self-determination and that of non-interference in internal affairs. In other words: would support to the independence movement in Aceh have been justified support to a people looking for self-determination, or would it have been interference in internal affairs? And what about East Timor?

Another issue is that processes that used to take place within one large territorial administrative unit have suddenly become international. For instance, nobody paid much attention to the moving of people from France to its colonies across the Mediterranean, or vice versa. Nowadays, such moves are called international migration. At the European level, special strategies are being developed to counter 'illegal' international migration from North Africa. We are, equally, very concerned about the moves of environmental refugees between countries in Africa that used to be part of the British or the French empire. Countries can also differ very much in the size of their populations and land area, and therefore in their population density; they range from small countries like Vanuatu and Singapore, to huge ones like Brazil and Russia. As members of the UN, all are equal, but they have very different characteristics and potentials. Small size can be a problem, particularly in countries in the Pacific or the Caribbean: some of these states are so small that they cannot guarantee the delivery of public goods to its citizens, such as safety and security, or good quality public health-care, etc.

Population growth and urbanisation

Population growth and urbanisation are leading to ever increasing pressure on land and water resources. As population densities tend to be the highest in the more fertile areas, large-scale urbanisation tends to be concentrated in such areas, contributing to important changes in their landscapes and the loss of farmland. Credible estimates by the IASA (Institute of Applied Systems Analysis in Vienna, which was led by former Wageningen professor Leen Hordijk, and will soon be led by Pavel Kabat, also a Wageningen professor) indicate that the world population might increase from almost 7 billion now to some 10 billion at the end of this century. The good news is that it is likely that this could be the peak of world population growth. However, this would be countries whose populations are still growing balancing out those countries whose populations are shrinking. The reality is that already 20 to 40% (depending on the standards used) of the world population is living in poverty or dire poverty. We have the daunting challenge to improve their living standards substantially, and also to create a real 'home' for all the new world citizens we will welcome in the coming decades. In general, population growth seems to be continuing particularly in countries with limited or even poor resources. This morning, Professor Rabbinge made some important remarks on the possible ways in which we could meet this challenge.

Many believe that urbanisation is the undesirable trend of people increasingly choosing an unsustainable way of life. In 2008, for the first time in history, more than half of the world population was living in cities in urbanized regions. Japan and the USA are leading this trend, with more than 90% of their populations living in such cities. This, however, is a trend not only in the urban-industrial developed world. In Latin America, for instance, 80% of the population lives in cities. It is also estimated that even in Africa, in around 2030 more than half of the population will live in urban regions; and in Indonesia, well over 60% will live in urban areas by as early as 2020.

Let me be clear: I believe that this is not only inevitable, but also by far the best solution. It is inevitable, because the more a country develops its agriculture, the fewer people it needs to work in this sector. The USA and the Netherlands – the world's two largest exporters of agricultural goods by value – have only 3% or less of their labour force working in agriculture. Japan, which works hard in the WTO to protect its agriculture, especially its rice growing, has seen the share of those working in agriculture shrink from 10 to 8% in the last decade, and more than half of these workers are already over 55 years old (Figure 4.6). All development may start with agricultural development, but it is crucial to think right from the start about the subsequent stages when the processing of agricultural products, the food industry, logistics, other industries and services must be developed to provide employment, a way of living, for a growing majority of the population.

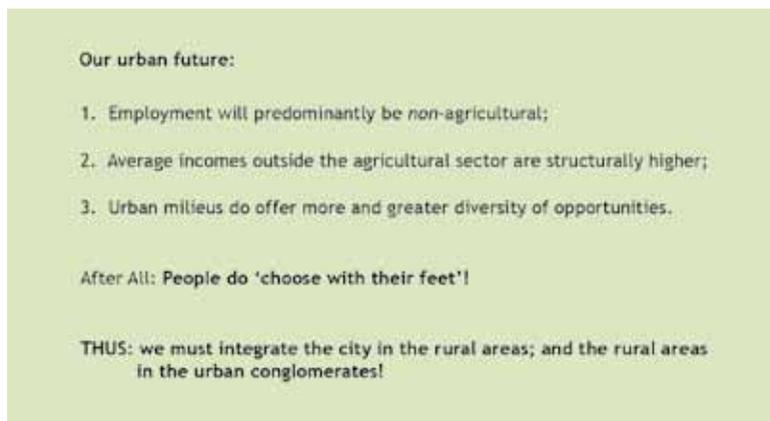


Figure 4.6: Why will our future be urban?

I am even convinced that urbanisation is in fact a desirable trend from the point of view of sustainability. The overall pressure on land resources is smaller when people live in higher concentrations, and the need for long distance transport also diminishes, as does the need for auto-mobility. It becomes more feasible and economical to provide excellent systems of public transport, like for example in Tokyo. Waste water treatment and solid waste management are much easier and, again, more economical. The crucial question, therefore, is not should we be for or against urbanisation, but: 'What kind of urban places should we develop?' As the major sustainability problems of urban agglomerations are directly related to congestion, to very high population densities over very extensive areas, we should try to address this crucial issue by giving 'space' to urban people; by bringing the rural to the urban and the urban to the rural; by bringing 'green' into the cities and employment opportunities to the rural areas (van Ginkel, 2008).

Environmental degradation and refugees

Whatever climate cynics may say about the details, it is obvious that climate change is occurring and that we urgently need effective strategies and measures to further as soon as possible both mitigation and adaptation. However, although our environmental problems include the climate change challenge, they go beyond climate change. The Club of Rome, for instance, particularly warned about depletion of all kinds of natural resources. Two of the crucial resources that are under severe threat are water and land. The Millennium Ecosystem Assessment (www.maweb.org) assessed the consequences of ecosystem change for human well-being. From 2001 to 2005, the MA involved the work of more than 1360 experts worldwide. Their findings provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide to people, as well as the scientific basis for action to conserve and use them sustainably. One of the more interesting findings of the MA is that while there are major concerns

about tropical forests and coral reefs, from the standpoint of linkages between ecosystems and people, the most significant challenges concern dryland ecosystems. These ecosystems are not only particularly fragile, but they are also the places where the human population is growing most rapidly, biological productivity is the lowest and poverty the highest. Drought leads not only to profound changes in landscapes at the local/regional level, but also to 'exports' of people and poverty through massive streams of environmental refugees.

Environmental refugees are people who can no longer gain a secure livelihood in their homelands, because of drought, soil erosion, desertification, deforestation and/or other environmental problems, together with the associated problems of population pressures and profound poverty (Myers, 2001). In their desperation, these people feel they have no alternative but to seek sanctuary elsewhere, however hazardous attempting to do so will be. They may or may not leave their countries, but they do leave their homelands. Norman Myers estimated that already in 1995 there were more than 25 million environmental refugees, and predicted that their number might double by 2010. Global warming and the resulting sea-level rise and coastal flooding – as well as the disruption of monsoon systems and other rainfall regimes, and droughts of unprecedented severity and duration – might lead to as many as 200 million environmental refugees. This timely and appropriate warning was met with quite some criticism, in part of course from climate change cynics. However, there was also debate on the appropriate word to be used: 'displaced persons' – who did not cross national borders, and therefore their own states are responsible for caring for them; 'migrants' – who crossed borders of their own free will and are held responsible for themselves; or 'refugees' – who are on the move, were forced to do so, because of war and violence, and for whom international agreements are in place and of whom international organisations take care.

The UN University Institute for Environment and Human Security (UNU-EHS, Bonn) has under its director Professor Janos Bogardi, another former professor at Wageningen, further elaborated the issue of environmental refugees (Renaud et al., 2007). The institute has come to the conclusion that environmental degradation and its consequences represent a highly underestimated problem. Environmental degradation from local to global scales can also be coupled with increased exposure to environmental hazards (e.g. floods, droughts, hurricanes) and will thus increase the risks these hazards pose to local populations. At times, the degradation can reach such levels that the provision of services is severely compromised and may then serve as one of several triggers for migration. Direct annual losses from environmental disasters are often already as high as USD 100 billion. The UNU-EHS scholars, however, have particularly drawn attention to the fact that environmental refugees are not recognized in world conventions. They therefore do not qualify for assistance, such as financial grants, food, tools, shelter, schools and clinics, from governments and international organisations in the same way as victims of war and violence do. This must change. Or in the words of Renaud et al. (2007, p. 30):

Farmers whose livelihood was destroyed by irrevocable desertification [clearly] need status and assistance similar to that of people fleeing from violence, war, ethnic cleansing or other harassment, irrespective of whether they crossed a border or not.

Environmental problems have already contributed to large permanent migrations, and could eventually displace hundreds of millions of people. Red Cross research shows that at the moment, more people are displaced by environmental disasters than by war. Though such migration is most acute in sub-Saharan Africa, there are also millions of environmental refugees in Asia. However, even Europe and the USA are witnessing pressure from victims of often mismanaged and deteriorating soil and water conditions in North Africa and Latin America. The concept of environmental refugees attracted considerable attention only when the Pacific island state of Tuvalu announced that it wanted to hold industrialized countries liable for causing the sea level rise due to their high levels of greenhouse gas emissions.

Integration and transnational corporations

Under the conditions of globalisation, the increasing knowledge intensiveness of almost all human activities and strong government support for the private sector, enterprises work over larger distances when competing for natural resources, markets, skilled labour, up-to-date knowledge, etc. Governments responsible for setting the optimal conditions for economic development are increasingly involved in this process and have come to the conclusion that without international cooperation they often cannot do much. Increased competition inevitably leads to selection, to fewer but larger units, and to subordination and hierarchization. Some enterprises grow the size and scope of their activities, while others disappear or merge with more successful enterprises. Important transnationals adapt their form of organisation to the circumstances – sometimes merging, sometimes downsizing, going back to their core business, sometimes outsourcing – and have their own agendas that clearly go beyond those of their country/countries of origin; to a certain extent, they become ‘footloose’.

‘Globalisation’ and ‘localisation’ are concepts at the level of society as a whole, which is more or less globalized and/or localized. ‘Decentralization’ and ‘integration’, however, are concepts related to institutions, whether they are states, provinces, enterprises or associations (Figure 4.7). Decentralization is a process directly linked to the increasing complexities of modern society as well as the improving levels of education and the related capacity of sub-national regions or, in the case of enterprises, divisions, to take care of their own development. An increasing number of individuals who are heavily involved in globalized activities and structures have a strong desire to regularly go back to their local roots to recharge, to be rooted somewhere. In the organisation of the world we see both trends: that towards the global (and macro-regional) and that towards the local (and micro-regional) operate simultaneously. We see comparable developments in the business world: decentralization, ‘back-to-the-core business’, outsourcing and spin-offs are all

efforts to make people closer to the real ‘workplace’ more directly responsible and keep their personal interest at the highest possible level, meanwhile maintaining the advantages of the economies of scale of the large firm. This is particularly important in today’s bigger enterprises and transnationals. Many of these companies are really working worldwide, and activities far from their main offices benefit from trust – trust that the people on the job are really capable of doing it and deserve a high degree of autonomy in meeting their challenges. Decentralization, often combined with various degrees of autonomy, can also serve to ease the tensions between highly diverse regions within the borders of one state or divisions within one company. Decentralization should often also serve to reduce bureaucracy.

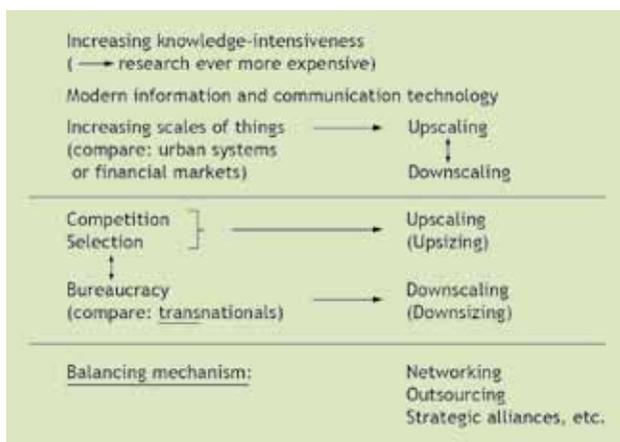


Figure 4.7: Three underlying currents for global change: a schematic overview.

In many countries, we can see processes of decentralization going hand in hand with integration on the world (supranational) regional scale. We can also see many companies decentralize in order to improve their capacity for the international expansion of their activities, either by themselves or in cooperation with other big international companies or even with local companies in various business arrangements. Countries ‘integrate’ in an attempt to strengthen their position globally through cooperation on a world regional scale, such as in the European Union, APEC, NAFTA, SADC, Mercosur or the African Union. This process of integration leads to a trend towards ‘new regionalism’ (Hettne et al., 1999, p.xv). Such regions might become major building blocks for the future world order. Some scholars, however, such as the former vice-rector of the United Nations University, Kinhide Mushakoji, fear that such macro-regions or ‘world regions’, almost on the continental scale, might instead prove to be major stumbling blocks on our way towards true globalism. In fact, the transfer of traditional nationalism to the level of the ‘world regions’ must be regarded as a major threat to peace and progress for all humankind. The development of a dollar zone, a euro zone and a yen zone, combined with a democracy that increasingly focuses

on persons ('making the president') with the strong support of the media is, indeed, a frightening perspective. A strong focus on individuals instead of parties and programmes might easily lead to the end of democracy and bring us into the position described in George Orwell's 1984, where a division of the world into three parts led to continuously changing coalitions and to economic and military warfare. Such developments are already foreshadowed by the changing coalitions of the USA, the EU and Japan in the WTO discussions and negotiations. The 'new regionalism', however, is a much more comprehensive, multidimensional, political phenomenon, one that includes economics, security, environment and other issues that challenge today's modern states. In the EU, for example, the deepening of the cooperation is as important an issue as enlargement. 'New regionalism' is therefore new in a qualitative sense, as it is an integral part of the current global transformation, which is often called globalisation in a much broader sense than its original meaning.

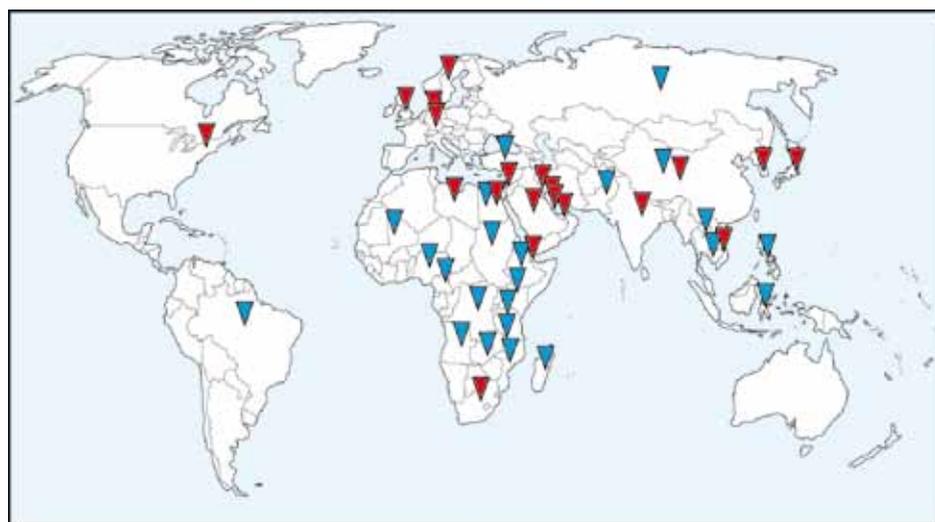
The process of the integration of states into world regions, a process that is visible all over the world, has created great opportunities for companies to operate much more easily at the international level and to transform themselves into true transnationals within the world regions of their origin and even worldwide. Free trade, and particularly 'open borders', has boosted the opportunities of companies to go international, multinational and transnational. Their rapid development was traditionally in the area of natural resources (such as oil) and banking; then development increasingly occurred in heavy industry, trade and entertainment, and now it is gradually happening in all sectors of economic activity. Especially enterprises from countries with relatively small populations, for instance the Netherlands and Switzerland, and thus with quite limited domestic markets, are often forced to look for markets abroad: Shell, Unilever, Philips, AKZO Nobel, ING Bank, Boskalis, Nestlé, Novartis, ABB, UBS, etc. However, countries too have increasingly become very active in acquiring contracts for companies to implement projects abroad. Particularly China has become very active in Africa, Asia and Latin America. I have seen Chinese firms working on a gigantic water pipeline that will run over 700 km from In-Salah in the centre of Algeria to Tamanrasset on the southern border. I have also seen them working on the road to connect Paramaribo with Cayenne in French Guyana. In fact, Chinese companies can now be found all over the world. Characteristic of these projects is that they focus on infrastructure, use quite traditional technologies and bring their own workers. The consequence of this is that the work is done at a relatively low price, on the basis of a loan provided by China with no strings attached, and without transfer of knowledge or much employment for the local population.

Worldwide territorial enclaves and exclaves

The previous paragraph is a good starting point for the last topic I should like to raise here. The Chinese worker camps are very much operated as exclaves outside the home country. They are run as 'homes away from home', not so unlike the Chinese tin-mining settlements in Malaya in

the 19th century. And they are no exception. Developing countries are increasingly characterized by having various enclaves run by various companies from various countries, in particular focusing on agricultural production, including forestry. It may be useful to note here that land acquisition abroad for agricultural use is not a completely new phenomenon. Japan, for instance, started to invest in farm plots overseas a century ago, and its overseas holdings are now three times the size of its domestic arable lands. However, many more countries have recently become active. China, for instance, started land leasing for food production in Cuba and Mexico some ten years ago. Joachim von Braun and Ruth Meinzen-Dick (2009) wrote the following about this phenomenon (see also Figure 4.8):

One of the lingering effects of the food price crisis of 2007-08 on the world food system is the proliferating acquisition of farmland in developing countries by other countries seeking to ensure their food supplies. Increased pressures on natural resources, water scarcity, export restrictions imposed by major producers when food prices were high, and growing distrust in the functioning of regional and global markets have pushed countries short in land and water to find alternative means of producing food.



▼ Selling land ▼ Purchasing land

Source: von Braun and Meinzen-Dick 2009, with data compiled from media reports 2007-2009.

Figure 4.8: Growing foreign land acquisitions: need for an international code of conduct.

It is interesting to see that even a country like the Netherlands is planning to reduce the total area available for agriculture and to export the actual growing of crops to other countries, while trying to maintain the income from the agricultural sector by providing top-notch knowledge

and technical support to the farmers in foreign countries. The initiative, however, can also come from agricultural entrepreneurs in the developing countries themselves. I visited a very large horticultural farm (some 500 ha) in the desert just outside the Nile valley, not so far from Cairo. A large part of this farm was under glass or covered with plastic greenhouses. The people working there formed a very international community. Several Dutch people were working there, too, contributing their highly valued skills and expertise. The farm was almost solely producing fruits and vegetables for the EU market. In order to have access to that market, the farm was under continuous supervision and control by the EU.

In themselves, these are interesting ideas and they have the potential of creating a real 'win-win' situation for all. These direct and indirect land acquisitions have the potential to inject much needed investment and know-how into agriculture and rural areas in poor developing countries. They also provide some guarantees with regard to accessing the markets of developed countries. It is important, however, to also pay attention to the possible negative consequences of this strategy. Concerns are justified about the impacts on poor local people, who risk losing access to and control over land on which they depend. It is therefore crucial to ensure that these land deals, and the environment within which they take place, are designed in ways that will reduce the threats and facilitate the opportunities for all parties involved. It is also important to, for instance, ensure that the soil fertility of the land used and the groundwater supply are maintained.

4.5 An emerging world order?

The overarching theme of this jubilee conference is Globalisation & Landscape Change. I was asked to focus on the sociocultural and governance aspects. Special attention should also be given to the role of scale. Now, a decade into the 21st century, we are increasingly confronted with the question: what will the world look like in ten or twenty years from now? How will it be organized? In this paper I have tried to analyse the trends, problems and opportunities in the organisation of the world. I now present some suggestions.

We looked at the state of our world and the main processes shaping it, namely glocalisation, the development of the knowledge-intensive society, the growing importance of ethics and values, climate change and environmental disasters, and fundamental shifts in the balance between public and private. We then focused on interactions between people and institutions at different scale levels: decolonisation, changing patterns of population growth and urbanisation, environmental degradation and forced migration, integration and transnational corporations, and the worldwide development of various forms of enclaves and exclaves.

Globalisation and integration can largely be described in terms of up-scaling or upsizing processes. On the other hand, localisation and decentralization must be regarded in terms of

downsizing and downscaling, including outsourcing and networking, and strengthening sub-national regional identities and autonomy. Integration is based on increasing the networking and cooperation of institutions, including states, at various levels of geographical scale. Localisation should be seen as a process to ascertain territorial and societal identity in the first place, leaving open the question of future networking and cooperation, for the time being only stressing the need to protect local and micro-regional identities and interests. The problem, however, is that there is no either/or: all processes take place at the same time, interacting with each other, giving rise to a kaleidoscopic reality.

'It is difficult to predict, in particular the future,' Nobel Prize winner (1922) Niels Bohr once said. Different patterns, however, are emerging. Former US President George H.W. Bush was absolutely right when, after the fall of the Berlin Wall, he started to speak about the establishment of a new world order. Indeed, a new world order has gradually been taking shape since the demise of the Cold War bipolar power structure. As a consequence of the increasing dominance of information and communication, however, this new world order will be multipolar and not primarily based on 'spaces', 'areas' or 'territories' like the political maps in primary school atlases, but on channels and nodes, on flows of various sizes or volumes and frequencies, in complex hierarchies. The best impression of this new world order follows from a careful analysis of the world's major financial markets and the volume and frequency of communication and information streams between them. An approximation of this 'new world' can also be arrived at by studying the maps of, for instance, the telephone traffic – which is so important for the use of the Internet – between the USA and the rest of the world. Maps of the major airline systems on the global, continental (macro-regional) and national level also give a good illustration of our shrinking, increasingly kaleidoscopic world-in-motion.

Where national borders become less important, the lines of communication and transport become increasingly important. These form the skeleton of the new world order. The future of borders is illustrated very well on the road from Rotterdam to Antwerp: at the Dutch/Belgian border, the traffic light is always green. The consequences of this development are twofold. First, whereas the world's population is increasing, the inhabited part of the world is shrinking. This does not mean that ever larger parts of the world are completely empty, because man is going everywhere, increasingly so, at ever greater speed and with ever greater ease. Population densities and the permanent use of land, however, are decreasing in many parts of the world. In China, for instance, a major policy is being implemented to slow down and reduce the migration of people from rural areas to the major cities. Satellite towns are being developed and the growth of rural centres promoted in a process of 'decentralized concentration', something that is not unfamiliar to the Dutch (Figure 4.9). The large majority of the world's population will live in cities, but the main question is: in what kind of cities? And what will these cities look like? Many of the more unfavourable areas will have an increasingly sparse population, whereas both the

number and the size of mega-cities are growing rapidly. Another example of this trend is Finland. Since it became a member of the European Union, many farmsteads in the central parts of this country have been turned into second homes. Permanent living there is no longer possible, because its harsh climate means the agriculture is no longer sufficiently competitive within the European market.

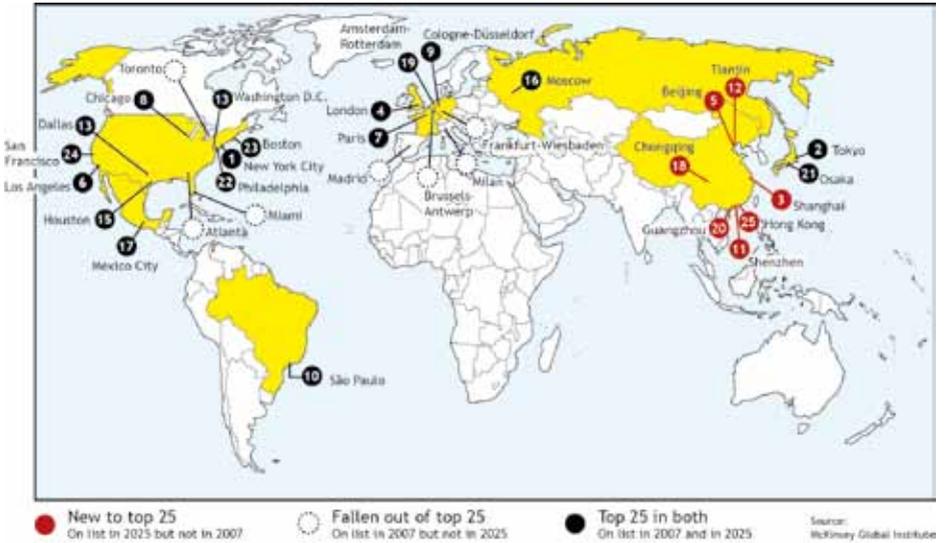


Figure 4.9: 'Holland City' – number 19 among the 25 main urban conglomerations in 2025.

Second, less and less our world is subdivided into sub-worlds (first, second and third world countries, or developed, developing and socialist countries, North and South, etc.). The hierarchisation of countries – or in large countries like India and Brazil, the hierarchization of their various main regions – increasingly takes place on the basis of the position of the main urban agglomeration in the world order of inter-connectedness and linkages (Figure 4.9). Whether a location is characterized as favourable or unfavourable depends less on physical conditions (climate, soil, etc.) and ever more on time/distance to the major nodes in the global system of world cities and transport and communications channels and flows. The export of flowers from the Netherlands is now related less to the quality of the country's soils than to the quality of the logistical system that ensures that flowers can be sold to individual clients all over the world within 24 hours after they have been cut. Some of the flowers 'from the Netherlands' that are sold in the USA come directly from countries in East and South Africa, such as Kenya or Zimbabwe.

Globalisation and integration offer enterprises and states important scale and economic advantages. At the same time, however, in this process states lose a substantial part of their sovereignty and authority, particularly in the economic and financial domain. Meanwhile, they also give up part of their sovereignty in the political and security (including the environmental) domains within the framework of the UN. In a great variety of sectors, states also increasingly share responsibilities with institutions at higher as well as lower scale levels, both by strengthening regional integration and through ever more decentralization. Will this, then, mean the end of the nation state, as many have predicted? Obviously not. In the first place, because the nation state has always been a myth rather than reality. Even in Europe it is difficult to find a good example, as the borders of countries are no more than the outcome of a historical process. The UK has installed parliaments in both Scotland and Wales with wide-ranging powers in order to address increasing demands for more autonomy or even independence. In Catalonia, Spain, children and students are taught in Catalan rather than Castilian. Finland has an important Swedish minority etc. In the second place, however, because no one can expect the states (or state officials) to abolish themselves. France's prime minister illustrated this clearly, already more than a decade ago, by defining Europe as a 'Federation of Nation States'. Since then, it has become very clear that even that is seen by EU Member States as too much. We will have neither a 'Europe of the Regions' nor a 'Europe of the Nations'. The Member States increasingly stress the importance of their cultural identity and sovereignty: no proposal that does not respect state borders will be passed. The tone and substance of the debate on the economic and financial support packages for Greece demonstrates that a large majority of Europeans are not (yet?) prepared to accept citizens of other EU Member States in the same way as they accept the other citizens of their own country. After all, do not all countries have richer and poorer regions? And is it not a common policy within countries to develop support policies to improve the living standards in the poorer parts? It is clear: because of nationalism and chauvinism, and perhaps short-term self-interest, Europe could easily fall behind, despite having had an early start. In Africa and Latin America, for instance, it might be more feasible to integrate the member countries faster and with less reluctance to accept higher degrees of unity. Interestingly enough, economic and financial realities are forcing Europe to accept more and more integration in practice. This is also happening in other macro-regions of the world. This might be called 'creeping integration' or, depending on your point of view, 'pragmatic integration'.

The previous discussion leads to the identification of some major features of the evolving new world order:

- (a) The globalisation process will accentuate a core structure or skeleton of nodes and channels, with a gradual strengthening of the hierarchy between the various nodes and channels.
- (b) The integration process will gradually bring about a series of 'world regions', each with its

- own development path and degree of integration, as major building blocks of the future, global, multilateral system.
- (c) The states will remain but play a less important role, as they have delegated part of their responsibilities and authority to the UN and other institutions at the global and the world-regional level, as well as in the decentralization process to the respective regions and municipalities or other institutions (e.g. universities, as in Japan) in the country. Besides, the globalized economy will make it difficult for the state to pursue its economic and financial policy independently. Subsidiarity will be crucial.
 - (d) Sub-national regions – like Bayern, Wales, Catalonia, Toscana, etc. – will play an increasingly important autonomous and almost independent role.

In this context, one question remains: to what extent will the matryoshka (Russian doll) process further influence the emerging world order? The answer should probably be 'to no extent'. This answer needs some explanation.

First, many small countries that have a population of a million or less find it extremely difficult to deliver the public goods they should deliver (safety and security, adequate public health, etc.) and to maintain the large variety of international relations and obligations. To do so, they increasingly combine forces with other countries they trust.

Second, the world community, in particular the bigger countries, are not much in favour of more and more, smaller and smaller countries, as this makes it increasingly difficult to oversee the world scene and develop adequate policies. The position taken with regard to Kosovo is illustrative: for a long time, Kosovo was supported as a substantially autonomous region, not as an independent country. Kosovo is still not recognized as an independent country by all UN Member States. This is in line with the positions taken over time with regard to, for example, Biafra, Katanga and the Moluccas or Aceh.

Secession and changing borders in general may not be the right way forward. This has so far endangered peace and progress much too seriously. Peaceful solutions have proved to be difficult to find. This leads to a last major element in the future world order:

- (e) States will have to cope in an adequate way with ethnic, cultural and religious diversity. Centuries of migration have led to a situation in which heterogeneous populations are the rule rather than the exception. Democratic systems therefore have to safeguard the interests of minorities. This asks in general for proportional elections, multiparty systems, coalition governments and respect for the views of minorities.

Meanwhile, a great variety of institutions – from the biggest trans- and multinational corporations to the humblest NGOs and public and private institutions – will continue weaving the structure and texture of the future world in their daily practices. The economic, social and cultural relations will most likely develop much faster than the political ones. Thus, the realities of the everyday life of common citizens might after all be the most important force to change our world at all scales, from local to global: ‘Think Global, act Local’, but also ‘Think Local, act Global’.

REFERENCES

- Albrechts, L. (2006) Bridge the gap: from spatial planning to strategic projects. *European Planning Studies* 14(19): 1487-1500.
- Annan, K. (1999) *Preventing war and disaster: a growing global challenge*. Annual Report 1998 of the Secretary General. United Nations, New York.
- Baffes, J. and Haniotis, T. (2010) *Placing the 2006/08 commodity price boom into perspective*. Policy Research Working Paper 5371, Development Prospects Group, World Bank.
- Bohnet, I., Potter, C. and Simmons, E. (2003) Landscape change in the multifunctional countryside: A biographical analysis of farmer decision making in the English High Weald. *Landscape Research* 28(4): 349-64.
- Braudel, F. (1972-73) *The Mediterranean and the Mediterranean world in the Age of Philip II*. Collins, London.
- Busck, A.G., Kristensen, S.B.P., Præstholt, S., Reenberg, A. and Primdahl, J. (2006) Land system changes in the context of urbanisation: examples from the peri-urban area of greater Copenhagen. *Danish Journal of Geography* 106(2): 21-34.
- Butler, S.J., Vickery, J.A. and Norris, K. (2007) Farmland biodiversity and the footprint of agriculture. *Science* 315: 381-385.
- Castells, M. (1996) *The rise of the network society*. Blackwell Publishers; Oxford, UK and Malden, Massachusetts, USA.
- Chartres, C.J. and Varma, S. (2010) *Out of water: from abundance to scarcity and how to solve the world's water problems*. Financial Times Press, Upper Saddle River, New Jersey, USA.
- Clapp, J. and Dauverge, P. (2005) *Paths to a green world. The political economy of the global environment*. The MIT Press, Cambridge, Massachusetts.
- Claval, P. (1964) Essai sur l'évolution de la géographie humaine. In: *Cahiers de Géographie de Besançon*, no. 12.
- Cowell, S. J. and Parkinson, S. (2003) Localisation of UK food production: an analysis using land area and energy indicators. *Agriculture, Ecosystems and Environment* 94(2): 221-236.
- Dalziel, P. and Lattimore, R. (2004) *The New Zealand macroeconomy: striving for sustainable growth with equity* (5th edition). Oxford University Press, Melbourne.
- Dwyer, J. and Hodge, I. (2001) The challenge of change: demands and expectations for farmed land. In: Smout, T.C. (Ed.) *Nature, landscape and people since the Second World War*. Tuckwell Press, East Linton, pp. 117-134.
- Emanuelsson, U. (2009) *The rural landscapes of Europe – How man has shaped European nature*. Forskningsrådet Formas, Stockholm.

- Etzkowitz, H. (2000) *The second academic revolution: MIT and the rise of entrepreneurial science*. Gordon and Breach, London.
- Evans, L.T. (1998) *Feeding the Ten Billion. Plants and population growth*. Cambridge. University Press, Cambridge.
- European Environment Agency (2004) *High nature value farmland. Characteristics, trends and policy challenges*. EEA report No. 1/2004, Copenhagen.
- European Environment Agency (2006) *Urban sprawl in Europe. The ignored challenge: characteristics, trends and policy challenges*. EEA-Report 10/2006, Copenhagen.
- Expert Meeting on How to Feed the World in 2050 & Food and Agriculture Organization of the United Nations (2009) *Proceedings of the Expert Meeting on How to Feed the World in 2050 [electronic resource]: 24-26 June 2009, FAO Headquarters, Rome*. Food and Agriculture Organization, Rome. http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf.
- Foster, D.R., Donahue, B., Kittredge, D.B., Motzkin, G., Hall, B., Turner, B. L. and Chilton, E. (2008) New England's forest landscape. Ecological legacies and conservation patterns shaped by agrarian history. In: Redman, C.L. and Foster, D.R. (Eds.) *Agrarian landscapes in transition*. Oxford University Press, Oxford, pp. 44-88.
- Giddens, A. (1990) *The consequences of modernity*. Polity Press, Cambridge.
- Goodmann, D. and Watts, M. (Eds.) (1997) *Globalising food. Agrarian questions and global restructuring*. Routledge, London.
- Gottman, J. (1961) *Megalopolis: the urbanized north-eastern seaboard of the United States*. Twentieth Century Fund, New York.
- Hall, P. (2002) *Urban and regional planning* (4th edition). Routledge, London.
- Healey, P. (2009) In search of the "strategic" in spatial strategy making. *Planning Theory & Practice* 10(4): 439-457.
- Hettne, B., Inotai, A. and Sunkel, O. (Eds.) (1999) *Globalism and the new regionalism*. United Nations University/World Institute for Development Economics Research (UNU-WIDER, Helsinki), Palgrave MacMillan.
- Ilbery, B. and Bowler, I. (1998) From agricultural productivism to post-productivism. In: Ilbery, B. (Ed.) *The geography of rural change*. Longman, Essex, pp. 57-84.
- International Water Management Institute (IWMI) (2009) *Flexible water storage options: For adaptation to climate change*. IWMI Water Policy Brief 31. International Water Management Institute, Colombo, Sri Lanka.
- Ioffe, G. and Nefedova, T. (2004) Marginal farmland in European Russia. *Eurasian Geography and Economics* 45(1): 31-45.

- Jones, M. (1988) Land-tenure and landscape change in fishing communities on the outer coast of Central Norway, C. 1800 to the present. Methodological approaches and modes of explanations. *Geografiska Annaler B1*, pp. 197-204.
- Jones, M (1991) The elusive reality of landscape. Concepts and approaches in landscape research. *Norsk Geografisk Tidsskrift* 45: 229-244.
- Maittiacci, A. and Vignali, C. (2004) The typical products within food 'glocalisation': the makings of a new twenty-first century industry. *British Food Journal* 106(10-11): 703-713.
- Marsden, T. (2003) *Condition of rural sustainability*. Van Gorcum, Assen.
- Marsden, T. and van der Ploeg, J.D. (2008) Preface: exploring the rural web. In: Van der Ploeg, J.D. and Marsden, T. (Eds.) *Unfolding webs. The dynamics of regional rural development*. Van Gorcum, Assen, pp. vii-ix.
- McCartney, M. and Smakhtin, V. (2010) *Water storage in an era of climate change: addressing the challenge of increasing rainfall variability*. Blue paper. International Water Management Institute (IWMI), Colombo, Sri Lanka.
- Meeus, J.H., Wijermans, M.P. and Vroom, M.J. (1990) Agricultural landscapes in Europe and their transformation. *Landscape and Urban Planning* 18: 289-352.
- Millward, H. (2006) Urban containment strategies: a case-study appraisal of plans and policies in Japanese, Canadian, and British cities. *Land Use Policy* 23: 473-485.
- Molden, D. (Ed.) (2007) *Water for food, water for life. A comprehensive assessment of water management in agriculture*. International Water Management Institute and Earthscan, London.
- Morgan, K., Marsden, T. and Murdoch, J. (2007) *Worlds of food: place, power and provenance in the food chain*. Oxford University Press, Oxford.
- Murdoch, J., Lowe, P., Ward, N. and Marsden, T. (2004) *The differentiated countryside: studies in human geography*. Routledge, London.
- Myers, N. (2001) Environmental refugees: a growing phenomenon of the 21st century. The Royal Society – *Phil. Trans. R. Soc. Lond. B* (2002) 357: 609-613.
- Nassauer, J.I. (2010) Rural landscape change as a product of US federal policy. In: Primdahl, J. and Swaffield, S. (Eds.) *Globalisation and agricultural landscapes: change patterns and policy trends in developed countries*. Cambridge University Press, Cambridge, pp. 185-200.
- Oldeman, L.R., Hakkeling, R.T.A. and Sombroek, W.G. (1991) *World map of the status of human-induced soil degradation. An explanatory note*. Global Assessment of Soil Degradation GLASOD. ISRIC, Wageningen, The Netherlands.

- Palang, H. and Printsman, A. (2010) From totalitarian to democratic landscapes: the transition in Estonia. In: Primdahl, J. and Swaffield, S. (Eds.) *Globalisation and agricultural landscapes: change patterns and policy trends in developed countries*. Cambridge University Press, Cambridge, pp. 169-184.
- Primdahl, J. and Swaffield, S.R. (2004) Segregation and multifunctionality in New Zealand landscapes. In: Brouwer, F. (Ed.) *Sustaining agriculture and the rural environment. Governance, policy and multifunctionality*. Edward Elgar, Cheltenham, pp. 266-285.
- Primdahl, J. (2010) Globalisation and the local agricultural landscape: current change patterns and public policy interventions. In: Primdahl, J. and Swaffield, S. (Eds.) *Globalisation and agricultural landscapes: change patterns and policy trends in developed countries*. Cambridge University Press, Cambridge, pp. 149-167.
- Primdahl, J. and Swaffield, S. (2010) Globalisation and the sustainability of agricultural landscapes. In: Primdahl, J. and Swaffield, S. (Eds.) *Globalisation and agricultural landscapes: change patterns and policy trends in developed countries*. Cambridge University Press, Cambridge, pp. 1-15.
- Primdahl, J., Andersen, E., Swaffield, S. and Kristensen, L. (forthcoming) Intersecting dynamics of agricultural structural changes and urbanisation within European landscapes – change patterns and policy implications. Paper submitted to *Landscape Research*.
- Redman, C.L. and Foster, D.R. (2008) *Agrarian landscapes in transition: comparison of long-term ecological and cultural change*. Oxford University Press, Oxford.
- Renaud, F.G., Bogardi, J.J., Dun, O., Warner, K. (2007) *Control, adapt or flee: how to face environmental migration?* InterSecTions No. 5, United Nations University Institute for Environment and Human Security, Bonn.
- Shah, T. (2009) *Taming the anarchy: groundwater governance in South Asia*. RFF Press, Washington D.C.
- Shah, T., Bhatt, S., Shah, R.K. and Talati, J. (2008) Groundwater governance through electricity supply management: assessing an innovative intervention in Gujarat, western India. *Agricultural Water Management* 95: 1233-1242.
- Smeets, P.J.A.M. (2011) *Expedition agroparks: research by design into sustainable development and agriculture in the network society*. Wageningen Academic Publishers, Wageningen.
- Sonnino, R. and Marsden, T. (2006) Beyond the divide: rethinking relationships between alternative and conventional food networks in Europe. *Journal of Economic Geography* 6(2): 181-199.
- Stanners, D. and Bourdeau, P. (1995) *Europe's environment. The Dobris assessment*. European Environment Agency, Copenhagen.

- Stavins, R.N. (1997) *Policy instruments for climate change: how can national governments address a global problem?* University of Chicago Legal Forum, pp. 293-329.
- Swaffield, S. and Primdahl, J. (2006) Spatial concepts in landscape analysis and policy: some implications of globalization. *Landscape Ecology* 21: 315-331.
- Swaffield, S. (2010) Local landscape consequences of macro-scale reform: the New Zealand experiment. In: Primdahl, J. and Swaffield, S. (Eds.) *Globalisation and agricultural landscapes: change patterns and policy trends in developed countries*. Cambridge University Press, Cambridge, pp. 95-125.
- Swaffield, S. and Primdahl, J. (2010) Globalisation and local agricultural landscapes: patterns of change, policy dilemmas and research questions. In: Primdahl, J. and Swaffield, S. (Eds.) *Globalisation and agricultural landscapes: change patterns and policy trends in developed countries*. Cambridge University Press, Cambridge, pp. 245-271.
- Swyngedouw, E. (1992) *Cities and regions in the New Europe*. Bellhaven Press, London.
- Swyngedouw, E. (2004) Globalisation or glocalisation: networks, territories and rescaling. *Cambridge Review of International Affairs* 17(1): 25-48.
- Termorshuizen, J.W. and Opdam, P. (2009) Landscape services as a bridge between landscape ecology and sustainable development. *Landscape Ecology* 24(8): 1037-1052.
- Tilman, D., Cassman, K.G., Matson, P.A., Naylor, R. and Polasky, S. (2002) Agricultural sustainability and intensive production practices. *Nature* 418: 671-677.
- Van der Ploeg, J.D. and Marsden, T. (Eds.) (2008) *Unfolding webs. The dynamics of regional rural development*. Van Gorcum, Assen.
- Van der Ploeg, J.D., Van Broekhuizen, R., Brunori, G., Sonnino, R., Knickel, K., Tisenkopfs, T. and Oostindië, H. (2008) Towards a framework for understanding regional rural development. In: Van der Ploeg, J.D. and Marsden, T. (Eds.) *Unfolding webs. The dynamics of regional rural development*. Van Gorcum, Assen, pp. 1-28.
- Van Ginkel, H. (1999) Networks and strategic alliances within and between universities and with the private sector. In: Hirsch, W.Z. and Weber, L.E. (Eds.) *Challenges facing higher education at the Millennium*. American Council on Higher Education/Oryx Press Series on Higher Education, pp. 85-92.
- Van Ginkel, H. (2001) Building a culture of understanding: the role of the university. *Global Dialogue – The Dialogue of Civilisations* 3(1): 84-92.
- Van Ginkel, H. (2003) What does globalization mean for higher education? In: Breton, G. and Lambert, M. (Eds.) *Universities and globalization. Private linkages, public trust*. UNESCO Publishing/Université Laval/Economica, Paris, pp. 71-80. Also published in French.

- Van Ginkel, H. (2005) Responsibilities, challenges, opportunities and governance – rethinking the university for the 21st century. In: *Higher education in the world 2006 – The financing of universities*, pp. XIX-XXVII. GUNI Series on the Social Commitment of Universities I, Palgrave.
- Van Ginkel, H. (2008) Urban future. *Nature* 456: 32-33.
- Vidal de la Blache, P. (1921) *Principes de Géographie Humaine*. A. Colin, Paris.
- Von Braun, J. and Meinzen-Dick, R. (2009) 'Land grabbing' by foreign investors in developing countries: risks and opportunities. IFPRI Policy Brief 13 – April 2009.
- Wegerich, K., Kazbekov, J., Lautze, J., Platonov, A. and Yakubov, M. (2011) From monocentric ideal to polycentric pragmatism in the Syr Darya: Searching for second best approaches. *International Journal of Sustainable Society* (accepted).
- Williams, R. (1973) *The country and the city*. Hoggarth, London.
- Wilson, G.A. (2001) From productivism to post-productivism and back again? Exploring the (un)changed natural and mental landscapes of European agriculture. *Transactions of the Institute of British Geographers* 26(1): 77-102.
- World Commission on Environment and Development (1987) *Our common future*. Oxford University Press, Oxford.
- Yokohari, M., Amati, M., Bolthouse, J. and Kurita, H. (2010) Restoring agricultural landscapes in shrinking cities: re-inventing traditional concepts in Japanese planning. In: Primdahl, J. and Swaffield, S. (Eds.) *Globalisation and agricultural landscapes: change patterns and policy trends in developed countries*. Cambridge University Press, Cambridge, pp. 225-243.
- Zlotnik, H. (2004) World urbanisation: trends and prospects. In: Champion, T. and Hugo, G. (Eds.) *New Forms of urbanisation. Beyond the urban-rural dichotomy*. Ashgate, Aldershot, pp. 43-64.

Around the world, the process of economic, political and cultural interaction and integration is advancing. Through adaptations of land and water use, this process of globalisation has consequences for the global landscape and for the landscape in our own country. But what are these adaptations, what are the consequences for the landscape, and how can or should we respond to them? This was the theme of the jubilee conference of the Land & Water Network, part of KLV Wageningen Alumni Network.

Globalisation & Landscape Change contains the results of the conference. It addresses the consequences of globalisation for the landscape and for the planning and management of the environment from different viewpoints. As such it presents a wide range of important insights for all those who are working on or interested in land and water issues, to help them gain a better understanding of the broader international context of their activities.