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# Future of Food

State of the Art, Challenges and  
Options for Action

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Francisco Marí & Julia Pippig

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## State of the Art, Challenges and Options for Action

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## Preface

From autumn 2010 to winter 2011/12 the project ›Future of Food‹ has been conducted. The Federation of German Scientists (FGS) intended to bring together scientists – also young scientists –, NGOs, and the interested public in order to rise public awareness and cooperative efforts to the complex and enduring challenges arising from global hunger, poverty and environmental degradations. The IAASTD-Reports, adopted in 2008 and published in 2009, give a valuable and pointing the way ahead source for scientific inquiries as well as policy options. In November 2011 an international conference in Berlin/Germany took place. The present book results from discussions from this conference as well as other consultations during the project.

The editors like to express their gratitude to all colleagues and institutions, which have helped to realize this book by their contributions. First of all we'd like to give thanks to the authors who notwithstanding manifold other workloads have cooperated marvelous and produced their texts nearly in our time schedule. Nonetheless we had some delay during the publishing process – as with every cooperative effort. The Nexus Foundation in Geneva, which is working on the draft of a new international trade regime in favour of sustainable agriculture, which could replace the old WTO, also has helped with consultations and financial support. The *African Centre for Technology Studies* (ACTS) in Nairobi, the *BioVision Foundation* in Zurich and the Austrian Federal Environmental Agency in Vienna have helped to realize this book. Without the financial support and advice by the German Federal Foundation for the Environment (Deutsche Bundesstiftung Umwelt [DBU]) neither the international conference in Berlin nor this book could have been realized; many thanks especially to Helga Kuhn. Many thanks again to Elisabeth Bongert for translating six chapters as reliable as ever. Our heartier thank to all organisations and people with whom we were allowed to cooperate. Last, not least thanks to Clemens Herrmann and the oekom verlag for uncomplicated and ever friendly assistance.



## Foreword

*Achim Steiner had been invited to hold one of the key speeches at the International Conference »Beyond the Crossroads: new issues and persisting problems. Linking food security, sustainability science and sustainability politics«. Due to other obligations, he was not able to attend the conference in person. However, he delivered a short welcoming speech, which was read to the conference audience during the first plenary session and can be found below.*

Dear Colleagues,

I am sorry that I am not able to be with you today because of other commitments. However, I did not want to miss the opportunity to express my gratitude for having been invited to this important meeting as well as my deep appreciation in seeing that the future of food and agriculture, so important for sustainable development, is discussed here with many leading experts, stakeholders and colleagues.

We all know that we are reaching ecological limits of our land. We must rethink the way we create our own food and related food access, otherwise we risk undermining the future of the generations who will follow us. And we must succeed in doing so in a changing world, where the population is increasing and the risk of climate change becomes every day more real. What now looks a daunting and unrealistic task is not only achievable but also feasible, if only we decide to pursue and explore solutions that already exist, many of which the IAASTD report outlined at the time. UNEP strongly believes that by transforming our production and consumption pattern with the aim of respecting and enhancing the ecological base that underlies the production not only bring long-term benefits and sustainability, but also will contribute to achieve the goals of economic development.

This meeting is particularly timely as it has the opportunity to generate greater understanding and traction on sustainable agriculture especially as we prepare for Rio, where it has been recognized already as an emerging issue. As such, I hope that your deliberations will be helpful for all of us in shaping the development of a transformative outcome in Rio on the future of food and agriculture and I wish you all the best for a successful meeting.

With my best wishes

**Achim Steiner**



## Introduction

In recent years, some myriads of papers, books and declarations on issues of hunger, agriculture and feeding the world have been published; so, why another book? During our project dubbed ›Future of Food‹ in 2011 we've found overwhelming evidence for a structural nexus between the status of agriculture (including forests and fishery), hunger, poverty and health and all sorts of more or less violent conflicts. In many cases violent conflicts spring from unjust and unresolved entitlements to fertile land, from destruction of fertile land by industrial plants, mining or crude oil production, infrastructures or other forms of land use change. What appears all too often in media as ›ethnic‹ or ›religious‹ conflicts or wars is in most cases essentially a battle for the most fundamental natural source of human life and community, namely fertile land and freshwater (see chapter by E. Messer). Two hundred years of industrialization, based on fossil energy and sometimes labelled as a ›pyrotechnical project‹ (Schäfer 1993), combined with the long and lasting history of colonialism have produced and fortified a great global schism. What we today indicate as the ›global North‹ or the ›global South‹ is nothing else than an euphemistic phrase, which denominates this schism. But the phrase doesn't reveal the historical and procedural character of the divided world. In the course of the formal de-colonisation after WW II it became common to speak of four worlds: the 1<sup>st</sup> were the OECD-countries, the 2<sup>nd</sup> the socialist, the 3<sup>rd</sup> and 4<sup>th</sup> worlds the not industrialized countries, the latter the poorest. The Rostow-doctrin<sup>1</sup> was ubiquitous mainstream and seemingly undisputed, even the socialist countries struggled to industrialize, come hell or high water, just as in the Soviet Union in the 20s. But the industrial paradigm was in the long run built on sand. It destroyed in large parts the very fundament of human life and societies, namely the natural sources, prominent fertile soil, freshwater and clean air, forests and fishing grounds. We should remember every once in a while that the founding fathers of the US saw the cornerstone of free people, society and government in a piece of land which was by planting crops and nurturing animals the livelihood of a family (Agar & Tate 1936). But capitalist and other industrialism not only destroyed domestic natural re-sources and livelihoods, but also those of communities and peoples far away. The modern, i.e. industrial colonialism was a continuation of

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1 US economist and consultant to governments Walt W. Rostow (1916–2003) has postulated five stages of economic development of societies in history, building upon the historical school of political economy. From hunter-gatherers to agricultural societies the end of history comes with the industrial society of mass consumption, which means prosperity for all. Obviously this construct is nothing else than an idealized extrapolation of the US-society of the mid-50s of the 20<sup>th</sup> century. Rostow's doctrine had an enormous influence on what we now call development policy. See Rostow 1960.

the ancient agrarian colonialism from the times of the Roman Empire to the East Indian Company of the 18<sup>th</sup> century. It destroyed whole landscapes by an ever-increasing big industrial appetite for ores, gold, gems, aluminium, coal, crude oil etc. The wake of devastation was concealed from public awareness by seemingly sophisticated indicators of economic progress like the GDP, in which not only every destruction and accident contributes to the wealth of nation, but which also makes invisible – and therewith uncountable – the costs of environmental pollution, habitat destruction, loss of soil fertility, of cultural and biological diversity etc. But the sheer economic and, if nothing else, military power of the OECD-countries, especially after the collapse of the COMECON, had a good grip on the international discourse and thus continued to function as paragon for not industrialized countries.

These are some delineations of the historical background, why the struggle against hunger and poverty, food security for growing populations, and the sustainable use of the natural sources of life are issues, which during the last three decades has experienced a very contradictory attention. In the 80s of the 20<sup>th</sup> century matters of agriculture and agricultural politics in the OECD seemed vis-à-vis a radical de-regulation of the global financial markets, rapid progress of digitalization and globalisation of trade, industries and whole societies, a de-industrialization of countries in Europe and North America, given the European milk-lakes, butter and meat-mountains, and US-American wheat and maize surpluses foremost a problem of securing or reducing of subsidies. But many governments of not industrialized countries too looked at agriculture as a backward sector, which couldn't contribute relevantly to a prosperous future of society and economy. The long lasting marginalization of and perspective on agriculture as primary economic sector changed bit by bit in international politics with important global reports and conferences such as the Brundtland-Report of the World Commission on Environment and Development (1987), the UN Conference on Environment and Development in Rio de Janeiro (1992), the Carlsson-Ramphal-Report of the World Commission on Global Governance (1995) and the World Food Summit in Rome (1996). Conference documents and reports of commissions signified a slow but steady change of the perception and perspective on agriculture including forests and fishery. Some important elements are the following:

- The Earth with its diversity of ecosystems is a holistic system which has to be and can be maintained in all its local diversity by an economy of sustainability with all human activities.
- Rural areas, forests, rivers and lakes are parts of indispensable, by technologies not substitutable and irreplaceable ecosystems for all human societies which have to be used and managed in ways which secure the services and benefits also for future generations.



- Development not only means kinds of entrepreneurial und monetary growth and material wealth but also pre-eminently comprehensive facilitation of human development (health, education, justice, social inclusion), individually as well as collectively (Sen 1999).
- Every country und every community has to search and find their individual ways for development.
- Sustainable development implies a deceleration of the on-going rural exodus and increasing urbanization. A fundamental improvement of the livelihoods in rural areas is therefore of utmost importance which is part of local and regional food security.
- To foster worldwide a transition to sustainable development in all sectors of societies means a big challenge for political institutions, civil societies, science and all other stakeholders and a far-reaching change of business as usual-politics.
- The needed knowledge for transition is partly at hand – especially in agriculture, forestry and fishery – from experience, local and indigenous knowledge from millennia of creative practice by indigenous peoples and family farming in all parts of the world; other parts of knowledge has to be produced.
- Agriculture in OECD-countries with its heavy dependency on fossil fuels and chemicals is no model for the majority of the world's peoples and farms.<sup>2</sup>
- Fundamental preconditions of functioning agricultures have become endangered during the last decades, especially healthy soils, biological diversity und fresh water.<sup>3</sup>

The Millennium Development Goals (MDGs), adopted by the General Assembly of the UN in 2000, build on the nexus of health, poverty, hunger, food security, education, sustainable use of natural resources and global cooperation for development. They frame goals which should be fulfilled until 2015. Though the balance is mixed so far<sup>4</sup>, the MDGs state verifiable goals after all.

During the last decade some global assessments (GAs) have documented important knowledge, evidence and stimuli on many issues around food security, agriculture incl. fishery and forestry. These GAs are e.g.:

- Global Biodiversity Assessment (1995),
- Millennium Ecosystem Assessment (2005),
- Comprehensive Assessment of Water Management in Agriculture (2007),
- Global Forest Resources Assessment (2010),<sup>5</sup>

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2 IAASTD – Global Report 2009.

3 Global assessment on biological diversity (1995), IPCC-Assessment Reports (2007), MA (2005) and CAWMA.

4 MDG-Report 2012.

5 Published since 1946 in decennial intervals.

- Intergovernmental Panel on Climate Change Assessment Report (2007),<sup>6</sup>
- International Assessment of Agricultural Knowledge, Science and Technology for Development (2009),
- Assessment of Assessments on the State of Marine Environment (2009),<sup>7</sup>
- Global Environmental Outlook.<sup>8</sup>

Other important reports, which deal with more specific issues and problems, give additional evidence.<sup>9</sup> Unfortunately it hasn't been achieved until today to establish a cooperative cluster of regular global, science based assessment reports as an important fundament for the draft and preparation of political decision making – an exception are the ARs of the Intergovernmental Panel on Climate Change (IPCC) (see the chapter by H. Graßl).

All of the mentioned assessment reports, which have been prepared, written and reviewed by many thousands of experts, make available a robust corpus of knowledge and evidence. That corpus is a solid basis for political decision making and societal progress in favour of sustainable development – regardless a range of questions and problems remain to be clarified.

A key question for the future of agriculture and food security is the Janus-faced character of the global agriculture. We observe a schism between a very small group of big, capital intensive and industrialized farm businesses, which manage hundreds or thousands of hectares (ha) with heavy input of machines and chemicals, and in numbers a huge group, which mainly without machinery and other inputs cultivate a couple of hectares. This schism exists between the global North and South as well as in many countries, including the European Union (EKD 1987). Out of total 536 mio. farms, as many as 96 per cent manage an area smaller than 10 hectares. These family farms cultivate 21 per cent of the agricultural acreage and produce food for 57 per cent of the population in not industrialized countries – and 52 per cent of all people of the world (UN DESA 2007; FAO 2008). The cleavage of the world's agricultures can be observed also in another context. Climate change has severe impacts on agricultures, especially in the global South – which in turn contributes at least to the anthropogenic causes of global warming. Sub-Sahara Africa will suffer losses of yields up to 50 per cent by increasing temperatures, minor and irregular precipitations and severe weather. This situation constitutes for the societies concerned – that applies for the

6 IV. AR in 2007, the V. AR is scheduled for 2013/21014.

7 Start-up Phase of a Regular Process for Global Reporting and Assessment on the State of the Marine Environment including Socio-economic Aspects, Findings of the Group of Experts, 2009) (UNEP, UNESCO, IOC [Intergovernmental Oceanographic Commission]).

8 Published since 1997, GEO 5 in 2012 (UNEP).

9 E.g. 21 Issues for the 21st Century. Results of the UNEP Foresight Process on Emerging Environmental Issues, Nairobi 2012 (UNEP); The State of the World's Land and Water Resources for Food and Agriculture (SOLAW). Managing systems at risk, London: earthscan 2011 (FAO).

Asia/Pacific-region also<sup>10</sup> – enormous challenges in adaptations to as well as mitigations of climate change.<sup>11</sup> The energy and chemistry-dependent agriculture (plant production and industrial animal production) combined with the food industries is one of the big greenhouse gas emitters, especially of carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O) und methane (CH<sub>4</sub>), roughly 44 to 57 per cent of all greenhouse gas emissions.<sup>12</sup>

During the last decade additional changes emerged, some resulting from new, some from long-ranging causes. Thus the world's agricultures are locked in a kind of permanent crisis and the so often proclaimed goal of global food security remains far away. One thread is the use of important food plants and other biomass for the production of electric power (via biogas) and liquid fuels. This just recently founded political economy, which is driven mainly by the EU and US with big subsidies, meanwhile has a relevant impact on global food prices and the availability of food. What during the last decade of the 20th century has begun as means to reduce import-dependence regarding crude oil and decentralized use of agricultural surpluses meanwhile is a multibillion business which mainly is run by the big multinational oil corporations. From the corn yield 2012 in the US, which has shrunk by a great drought<sup>13</sup>, nearly 40 per cent are used to produce fuels. This share is lower in the EU – but food crops like wheat are used for fuel production as well. There have been early scientific evidences from life cycle assessments and availability checks, which mainly produced negative results (Albrecht & Schorling; WBA 2007; Leopoldina 2012). This research indeed had no impact on political decision-making. EU has constituted in 2006 mandatory blending quota of 5,75 per cent from the year 2010 on and of 10 per cent from 2020 on. Not earlier than in the last quarter of 2012 the EU commission has pronounced some reservations to the feasibility of the legal blending quota. From the beginning it has been without any doubt that the 10 per cent-goal in the EU could be realized solely by an import-quota for bio-fuels or raw materials of 50 per cent. Thus the new economy of bio-fuels just exchanges the countries from which EU is dependent. The use of food plants such as soy, maize, wheat and other crops in large quantities results in direct and indirect land use changes. In Malaysia and Indonesia, but also in Brazil and other countries of the South land use changes also bring about the destruction off tropical forests, which are logged of and replaced by oil palm plantations or used as pastures for cattle.<sup>14</sup> Such developments impair

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10 Asian Development Bank 2012; UNESCAP, ADB & UNEP 2012.

11 Hoffmann 2011.

12 Schellnhuber et al. 2012.

13 USDA assesses the corn yield in 2012 with 272 mio. t ca. 40 mio. t lower than in 2011, ca. 13 per cent. Harvest in 2013 is according to USDA bumper crop, share for fuels again rising.

14 In Brazil the Cerrados, which are used as pastures and which build an area as large as western Europe (2 mio. km<sup>2</sup> = 200 mio. ha), are cleared from trees and shrubs and used for the production of soy beans. Cattle ranchers in turn go to clear cut forests.

the struggle for food security in the countries concerned. Furthermore they contribute to global greenhouse gas emissions.

A second trend comes by commercial and foreign investments in fertile land and agriculture in Africa and in South Asia. Data and facts are not very reliable so far because many agreements are confidential. Informed assessments calculate on an area between 80 und 200 mio. ha. Foreign direct investments which are recorded in the UNCTAD statistics encompass accumulated for the years 2005–2011 totally 110 bn. US\$ (86 bn. €), from which 50 bn. US\$ (39 bn. €) are apportioned to the EU, 13 bn. US\$ (10 bn. €) to the US, 6 bn. US\$ (4,7 bn. €) to Africa and 15 bn. US\$ (12 bn. €) to South and Southeast Asia (Heumesser & Schmid 2012, 17). Investors are sovereign wealth funds, private equity and hedge funds, but also pension funds. Three business models are prevailing:

- Large-scale acquisition of land, by direct purchase or long time leasing (99 years);
- Contractual growing;
- Joint ventures.

As investors act alongside the mentioned state and private corporations and commercial banks also national governments such as PR of China, Republic of Korea, the Gulf-States, the Kingdom of Saudi-Arabia, Libya<sup>15</sup>, Brazil and the United Arab Emirates. Destination countries are the Democratic Republic Congo, Ethiopia, Madagascar, Mozambique, Sudan, Tanzania, Cambodia, Indonesia, Laos, Pakistan, the Russian Federation and the Philippines.<sup>16</sup> Though existing data show that big land investments come from the EU and US, it is remarkable that countries such as the PR China and Brazil do considerable businesses (Rudloff 2012). Most of all are land investments dedicated either for food production in favour of the investing countries, above all from crude oil exporting countries, or for production of plant oil and other raw materials for fuels. They are not contributing to food security – rather to the contrary. Displacements of indigenous farmer families and of other community members, despotic expropriations if property rights are not documented or confirmed and the destruction of natural and cultivated landscapes are orders of the day as well as simple fallowness. Thus the loss of huge areas of fertile land instigates conflicts of all kinds (see chapter by M. Brüntrup).

A third thread of developments also influences the world's agricultures. That means the evolution and practices of vertical integrated, global agro-food-corporations (agro-food-TNCs<sup>17</sup>) (McCullough et al. 2008; UNCTAD 2009). A specific feature of these

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15 Those investments have been arranged under the regime of Muamar Al Gaddhafi.

16 The international NGO GRAIN ([www.grain.org](http://www.grain.org)) has established a website with informations and documents concerning land investments ([www.farmlandgrab.org](http://www.farmlandgrab.org)).

17 According UNCTAD Transnational Corporations (TNCs) are businesses which act in at least two countries by direct investments.

corporations is the combination of as many as possible elements of the agricultural and food value chain from production (inputs of all sorts including) to transport, storage, processing, wholesale and retail. The economic structure of these corporations completely simulates industrial production and marketing structures such as in the textile, metal, leather or electronics industries since the 70s of the 20<sup>th</sup> century: Manufacturing bases are selected by criteria like minimizing costs and maximizing profit. Core criteria are as low as possible labour costs, weak or absent laws and collective rights for labourers, environmental regulations either missing or not enforced, subsidies such as gratuitous or infrastructures at a discount (company grounds, freshwater, sewage, electric power), tax and customs duty relief, guaranties for profit transfer to the company headquarters or tax flight oases. A sophisticated system of sub- and sub-sub-contractors is practiced, who are formally independent contractors but in fact employees. They have to work according detailed prescriptions e.g. in crop production or animal fattening from exact regulations of pesticides, antibiotics etc. through to packaging. Risks of all sorts remain with the dependent contractors because the corporation only accepts standard-conform products. And the standards often correspond to those for marketing in OECD-countries. Furthermore, accounts are balanced by unit costs so the corporations take no risk either. Vertical integrated agro-food-corporations have in this way established a huge worldwide power structure, which commands prices and supply of food. This power has profound effects for export-oriented farms in not industrialized countries, especially for family farms if they want to participate in international markets. Agro-food-corporations, especially chains of super-markets, recently try to expand to and dominate national food market systems alongside their successful oligopolistic power in countries such as UK, Germany or US as we can currently observe in India (see chapter by S. Sahai).

Loss of biodiversity on all levels<sup>18</sup>, destruction of ecosystems, and the on-going destruction or degradation of fertile soils by erosion, infrastructures, industrialization and expansion of urban areas are two additional factors which hamper the perspective of food security for all human beings in the future.

During the last years the gap between knowledge and decision making for ways out of the permanent crisis in world's agriculture and making the MDGs reality has widened. Neither in many national states nor in the UN-system nor in discussion groups such as G 8 or G 20 clear goals and verifiable and relevant measures for an effective strategy for food security could be accomplished.<sup>19</sup> Instead we see well- pronounced declarations on Sunday and institutional rivalry, overlapping of competencies and plain and simple political disinterest on workdays.

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18 Biological diversity is constituted by three elements: genetic, species and diversity of habitats.

19 Notable exceptions are countries like Brazil, Venezuela or PR China.

Summarizing the situation and future of food security: Crisis is permanent and fundamentally, not only accidentally. But the dominant actors try to resolve the crisis with measures, structures and actions, which just have brought about the crisis – the business as usual-option. I'd like to note, though, that this feature characterizes the dominant actors. Many people on diverse levels of political and scientific institutions, and many parts of societies around the world have begun to think in a new way, to realize that sustainable development is not just a worthwhile catchword, rather a compass.

Our cause for this book therefore was twofold. On the one hand a critical analysis of the state of affairs, policies and politics, which are essential and causative for the on-going crises. On the other hand an outline of perspectives and options for action in diverse fields from research to economic and political practice. The book is divided in three sections. The first one is a critical analysis of the status quo. Where do we stand? It is important to keep in sight the multidimensionality of hunger, poverty, violent conflicts, environmental destruction and underlying economic processes. Agriculture and fishery are in many countries and for many people closely linked activities for securing their livelihood. Therefore it is important to look at this context. The second division deals with challenges of sustainability oriented politics of transforming world's agriculture: Challenges ahead. Assessments and evidences are presented to e.g. large-scale land investments or acquisitions and the potential market-excluding impacts of international standards and certifications for family farms and cooperatives and likewise options for actions, also with the UN system. The third division deals with a broad spectrum of possible actions and measures: What can we do? The human right to food here is at the centre in several respects, but also issues of education, training and opportunities of actions by finance institutions, which have a stake in promoting food sovereignty.

People from different continents and various professional affiliations have written the chapters of this book. Foremost all of them have in common an engagement for an effective transition of the world's agricultural and nutrition regimes in order to end hunger and poverty, environmental destruction and violent conflicts. As mentioned earlier, in spring 2008 the IAASTD final report has been adopted.<sup>20</sup> The seven volumes of IAASTD comprehend manifold evidences, insights and options for actions. The authors of this book also are bound up with the task of achieving a regular international agricultural assessment similar to the regular climate assessment reports of the IPCC. During an international conference in November 2011 in Berlin/Germany the Berlin Declaration has been drafted which is documented as well in this book. Some hope for progress towards a regular international agricultural assessment has existed concerning the UN conference Rio +20 in June 2012. The results of this conference have been anticlimactic, all things considered. But the task

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<sup>20</sup> 7 Vols., published by Island Press in 2009.

nevertheless remains unimpaired. The on-going global debates around the uplifting of the Commission for Sustainable Development (CSD) to a High Level Forum for Sustainable Development<sup>21</sup> and around the likewise decided upon drafting of Sustainable Development Goals (SDGs) until 2015<sup>22</sup> hopefully can become arenas for substantial progress.

Berlin/Bonn/Oldenswort, May 2013

**Stephan Albrecht**

**Reiner Braun**

**Zoe Heuschkel**

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**Julia Pippig**

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21 United Nations A/CONF.216/L.1: Rio +20: Outcome of the Conference, Paragraphs 84.–86., S. 16f.

22 United Nations A/CONF.216/L.1: Rio +20: Outcome of the Conference, Paragraphs 245.–251., S. 46f.

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**WHERE DO WE  
STAND?**