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Karsten Schulz

Linking Land and Soil to Climate Change

The UNCCD in the Context of Global Environmental Governance

Tectum Verlag

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Foreword of the Editor

Climate change and environmental degradation are certainly among the greatest challenges facing humanity. For almost forty years, the United Nations, in cooperation with several governmental and non-governmental institutions, has been actively involved in developing multilateral responses to address these interrelated threats. Most notably, the United Nations conventions on climate change, desertification and biodiversity emerged from the Rio Earth Summit in 1992. However, while discussions on climate change, endangered species and the future of the Kyoto Protocol have largely dominated public debate and media reports, the topic of desertification has unjustifiably been relegated to a niche existence for a long time. Yet, in light of the worsening environmental situation at the beginning of the 21st century and increasingly complex interactions between humans and the environment, new approaches to international governance and policy-making are required. It has become abundantly clear in recent years that the rapid loss of fertile soils as well as the negative impacts of drought and climate change on agriculture are severely endangering human well-being, particularly in rural dryland areas. Nevertheless, despite the numerous calls for a more integrated and coordinated approach to anthropogenic global change, the multiple aspects of desertification and climate change are still understood in rather ‘atomistic’ terms.

In his detailed transdisciplinary analysis, Karsten Schulz addresses these apparent deficits and provides a wealth of information on how climate change is related to land, ground, and soil on the biophysical, social, political, and economic levels. The main focus of his work is centered on the rapidly growing research area of Global Environmental Governance. Based on a sound analysis of the changing role, structure and policies of the United Nations Convention to Combat Desertification (UNCCD), he investigates how the multiple aspects of desertification, land degradation and drought can be better integrated into the ongoing climate change negotiation process. His approach is founded on the premise that the fragmented and politically-charged issue areas of environmental science and policy-making demand a fully integrative strategy based on systems thinking. By employing the notion of *ecosystem-based approaches*, he then makes specific suggestions for how to improve environmental policy integration and our understanding of potential synergies and conflicts between the desertification convention and the United Nations Framework Convention on Climate Change (UNFCCC). The book concludes with an outlook on the role that markets and payments for ecosystem services could play in regard to innovative financing for sustainable development.

These insights into the scope, impact and potential limitations of UNCCD and UNFCCC policies provide valuable indications as to what theoretical and practical improvements are necessary to make the recent efforts towards a more coordinated international approach to climate change and desertification more successful. Hence, the 13th volume of the series “Bonn Studies on Global Change” (Bonner Studien zum Globalen Wandel) presents a concise and cross-sectoral analysis of two of the most important environmental governance issues of our time.

Prof. Dr. Wolfram Hilz

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1 Introduction

“The nation that destroys its soil destroys itself.” – Franklin D. Roosevelt

Desertification is defined by the United Nations Convention to Combat Desertification (UNCCD) as “land degradation [...] resulting from various factors, including climatic variations and human activities”.¹ Over the past few decades, it has become increasingly clear that desertification poses a major environmental threat and endangers the livelihoods of millions of people, particularly in dryland areas.² Natural resources become scarcer through desertification, which exacerbates food insecurity and famines. This leads to more people using less arable land, which often facilitates desertification. A vicious cycle has emerged in many places. Consequently, the growing intensity of human pressure on fragile ecosystems entails poverty, migration and political instability.³ These facts reveal the urgency of the matter and indicate that the already grave situation will further deteriorate, unless the multiple dimensions of the problem are addressed coherently.

Yet the conceptualization of the term ‘desertification’ remains a subject of debate within the scientific community, since the complex socio-economic and biophysical processes that constitute the root causes for desertification are

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- 1 United Nations 1994: The United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa. Text with Annexes, p. 4. *For further detail on the use and definition of relevant scientific terms such as desertification, soil, land, land degradation, drought and drylands, see chapter three of this volume.*
 - 2 Cf. A. RODRÍGUEZ-RODRÍGUEZ / C.D. ARBELO: The Biophysical Context, Climatic Implications and Water Resources, in: José L. RUBIO / Vicente ANDREU (eds.): Human and socioeconomic consequences of desertification. Las Palmas de Gran Canaria 2009, p. 17-36, p. 25-26.
 - 3 Cf. Hans Günter BRAUCH / Úrsula OSWALD SPRING: Securitizing the Ground, Grounding Security (Desertification, Land Degradation and Drought Issue Paper no. 2). UNCCD 2009, p. 17. *For a definition of politics, policy and polity, see page 15 of this volume.*

inextricably entwined.⁴ Hence, there is a compelling need for improved monitoring and assessment of desertification and land degradation trends.⁵ The *Millennium Ecosystem Assessment* (2005) on desertification clearly indicates that long-term monitoring is a precondition to distinguish between the effects of human actions and climate variability on vegetation productivity.⁶

In order to tackle the causes and consequences of desertification on a global scale, the UNCCD entered into force on 26 December 1996.⁷ As of March 2011, there are 194 Parties to the Convention.⁸ The UNCCD is one of the three so-called ‘Rio conventions’ – among the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD) – which derive directly from the 1992 *United Nations Conference on Environment and Development* (UNCED), also known as the ‘Rio Earth

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- 4 Cf. S.M. HERRMANN / C.F. HUTCHINSON: The changing contexts of the desertification debate, in: *Journal of Arid Environments* 63 (2005), p. 538-555, p. 539. See also: Pierre Marc JOHNSON / Karel MAYRAND / Marc PAQUIN: The United Nations Convention to Combat Desertification in Global Sustainable Development, in: Pierre Marc JOHNSON / Karel MAYRAND / Marc PAQUIN (eds.): *Governing Global Desertification. Linking Environmental Degradation, Poverty and Participation*. Aldershot 2006, p. 5-10, p. 5; and: James F. REYNOLDS / Mark STAFFORD SMITH: Do Humans Cause Deserts?, in: James F. REYNOLDS / Mark STAFFORD SMITH (eds.): *Global Desertification. Do Humans Cause Deserts? (Dahlem Workshop Report 88)*. Berlin 2002, p. 1-22, p. 1-5. *Biophysical processes comprise phenomena such as soil erosion, soil salinization, biodiversity depletion and depletion of soil organic matter*. For further information on socio-economic processes, see: John B. DAVIS / Wilfred DOLFSMA: Social economics: an introduction and a view of the field, in: John B. DAVIS / Wilfred DOLFSMA (eds.): *The Elgar Companion to Social Economics*. Cheltenham 2008, p. 1-7, p. 2-3. *Socio-economics study the relation of economics to social values. The discipline regards the economy and economics as being embedded in the larger web of social and ethical relationships (including political frameworks). It also views economics and ethics as essentially connected, and adds values such as justice, fairness, dignity, well-being, freedom and equality to the standard emphasis on efficiency*.
- 5 Cf. Mariam AKHTAR-SCHUSTER / Harriet BIGAS / Richard THOMAS (eds.): *Monitoring and Assessment of Desertification and Land Degradation: Knowledge Management, Institutions and Economics* (White Paper of the DSD Working Group 3 edited by association of DesertNet International, United Nations University – Institute for Water, Environment and Health, Dryland Science for Development). United Nations University 2010, p. 7.
- 6 Cf. *Millennium Ecosystem Assessment 2005: Ecosystems and Human Well-being: Desertification Synthesis*, p. 19.
- 7 Cf. Lindsey C. STRINGER / Steffen BAUER: The Role of Science in the Global Governance of Desertification, in: *The Journal of Environment & Development* 18 (2009) 3, p. 248-267, p. 251.
- 8 Cf. *ibid.*, p. 251.

Summit'. As the sole multilateral environmental agreement which genuinely integrates sustainable development into the scope of its activities, the UNCCD aims to prevent or reverse land degradation trends, improve the living conditions and productivity of affected populations by establishing participatory mechanisms and partnerships, and serve as a global authority on scientific and technical knowledge pertaining to desertification, land degradation, and mitigation of the effects of drought.⁹ In light of comprehensive scientific evidence¹⁰ for a mutually aggravating relationship between the effects of land degradation and climate change, the UNCCD also operates as a "multilateral soil framework for adaptation, mitigation and resilience in combating the challenge/effects of climate change".¹¹

In general terms, desertification, land degradation and drought (DLDD) influence the climate on a local to regional scale, and through changes to the hydrological cycle.¹² More specifically, land degradation and subsequent vegetation loss in dryland areas contribute to global warming by producing carbon emissions of 230-290 million tonnes per year.¹³ Climate change in turn acts as a driver of desertification and additional stressor on vulnerable dryland popu-

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- 9 Cf. UNCCD 2009: Committee on Science and Technology (CST). Way Forward After CST 9 (CST Highlights no. 1), p. 1. See also: JOHNSON / MAYRAND / PAQUIN, loc. cit., p. 1. *Sustainable development is defined as "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations."* For further detail, see: Report of the World Commission on Environment and Development 1987: Our Common Future. Chapter 2 (I/15) (also known as the 'Brundtland Report'). Available at <<http://www.un-documents.net/wced-ocf.htm>>.
 - 10 Cf. AKHTAR-SCHUSTER / BIGAS / THOMAS, loc. cit., p. 12-13. See also: Martin A.J. WILLIAMS / Robert C. BALLING Jr.: Interactions of Desertification and Climate. London 1996, p. 2-3.
 - 11 UNCCD 2009: Climate change and desertification (UNCCD thematic fact sheet series no. 1), p. 2. *For further detail on climate change as well as climate change adaptation and mitigation, see chapter four of this volume.*
 - 12 Cf. D.A. MOUAT / J.M. LANCASTER: Desertification: Humans, Climate and Alternative Futures, in: José L. RUBIO / Vicente ANDREU (eds.): Human and socio-economic consequences of desertification. Las Palmas de Gran Canaria 2009. *The hydrological cycle describes the continuous movement of water on, above and below the surface of the Earth.*
 - 13 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH 2009 (ed.): Running dry? Climate change in drylands and how to cope with it, p. 13.

lations and ecosystems.¹⁴ The *Intergovernmental Panel on Climate Change* (IPCC) clearly acknowledges that climate change has a direct bearing on land, soil and agriculture.¹⁵ According to the Fourth Assessment Report of the IPCC, Africa is the continent most vulnerable to climate change.¹⁶ Climate change scenarios for many African countries include reductions in yields from rainfed agriculture of approximately 50% until 2020.¹⁷ Moreover, an increase of arid and semi-arid land of 5 to 8% (60-90 million hectares) is considered a probable scenario for Africa by the 2080s.¹⁸ It is evident that such events may adversely affect food security and sustainable development.

Regardless of these perturbing implications, the linkages between climate change and desertification in the drylands have only recently attracted wider scientific attention.¹⁹ In addition, the political interest in desertification has for a long time been relatively low among negotiators with an environmental background.²⁰ As pointed out by the UNCCD, the 'Copenhagen Accord' that emerged from the fifteenth meeting of the Conference of the Parties to the UNFCCC (COP15) made no references to DLDD, apart from mentioning deforestation and forest degradation.²¹ This lack of political momentum has often been interpreted as a result of the unique yet ambiguous political scope

14 Cf. Michel M. VERSTRAETE et al.: Climate change and desertification: Where do we stand, where should we go?, in: *Global and Planetary Change* 64 (2008), p. 105-110, p. 106. See also: Robert MENDELSON: The Impact of Climate Change on Agriculture in Developing Countries, in: *Journal of Natural Resources Policy Research* 1 (2009) 1, p. 5-19.

15 *The publications and reports of the Intergovernmental Panel on Climate Change can be found on the IPCC website:* <http://www.ipcc.ch/publications_and_data/publications_and_data_reports.htm#1>.

16 Cf. M. BOKO et al.: Africa, in: M.L. PARRY et al. (eds.): *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge 2007, p. 433-467, p. 435. See also: Uwe HOLTZ: Parliamentary contributions to achieving food security and addressing climate change in the drylands under the current economic crisis. Bonn 2009, p. 14. Available at <<http://www.unccd.int/parliament/docs/XM%20parliament%20background-eng.pdf>>.

17 Cf. BOKO et al., loc. cit., p. 435.

18 Cf. *ibid.*, p. 448.

19 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 11.

20 Cf. Zafar ADEEL et al.: *Revitalizing the UNCCD. Summary for Decision Makers*. September 2009, p. 4. Available at <http://www.inweh.unu.edu/drylands/docs/Revitalizing_the_UNCCD-English.pdf>.

21 Cf. UNCCD 2010: *Concept note Land Day 2*, p. 2. Available at <<http://www.unccd.int/publicinfo/landday/2010/docs/Concept%20note.pdf>>.

of the UNCCD.²² In the eyes of many, the Convention's tripartite focus on drylands, development and the environment as well as its particular emphasis on Africa resulted in "a lack of focused targets and [...] failure to secure adequate resources".²³ This notwithstanding, recent shifts in the UNCCD strategy and the outcome of the Cancún climate talks give cause for cautious optimism. The 'Cancún Agreements' established a Green Climate Fund, at least mentioned desertification in a footnote, and brought some advances in areas such as *land use, land-use change and forestry*.²⁴ Furthermore, the United Nations General Assembly dedicated the decade 2010-2020 to be a decade of awareness raising, education and advocacy on DLDD.²⁵ Yet it remains to be seen whether the Parties to the Convention and other relevant stakeholders will be able to finally overcome the major obstacles that accompanied the UNCCD process since its inception in 1992. The Parties to the UNCCD need to urgently proceed towards taking further action at the local level, as the cost of inaction to land degradation is high. With respect to the on-going climate change negotiations, it is evident that the most pressing challenges of climate change will only be addressed effectively, if a timely transition to a more sustainable, greener economy is to be achieved. Even with the agreements made in Cancún, countries fall well short of what the science suggests is needed to prevent the worst consequences of climate change and to collectively cope with environmental impacts such as droughts, floods and rising sea levels. At the same time, activities that capitalize on synergies among the Rio conventions are still not sufficiently put into practice. Against this background, the central question this volume addresses is: *"How can the UNCCD streamline its policies and build on already existing policy frameworks in order to successfully integrate the biophysical and development-related aspects of DLDD into global climate governance?"*²⁶

22 Cf. United Nations Joint Inspection Unit (JIU) 2005: Review of the Management, Administration and Activities of the Secretariat of the United Nations Convention to Combat Desertification (UNCCD) (JIU/REP/2005), p. 1-2. Available at <<http://www.unjiu.org/en/reports.htm>>.

23 ADEEL et al., loc. cit., p. 4.

24 Cf. UNFCCC 2010: Preparation of an outcome to be presented to the Conference of the Parties for adoption at its sixteenth session to enable the full, effective and sustained implementation of the Convention through long-term cooperative action now, up to and beyond 2012 (FCCC/AWGLCA/2010/L.7), p. 6. Available at <http://unfccc.int/files/meetings/cop_16/application/pdf/cop16_lca.pdf>.

25 Cf. United Nations Decade for Deserts and the Fight against Desertification (2010), in: <<http://unddd.unccd.int/>> (31.03.2011), n. p.

26 *For a definition of relevant terms, such as governance, global governance and global environmental governance, see chapter two of this volume.*

To answer this question, a cross-sectoral policy analysis is imperative. Instead of employing a policy approach that is mainly based on natural science data, the social, political and economic aspects of climate change and DLDD need to be integrated more effectively.²⁷ In addition, the position of the UNCCD within the system of global environmental governance (GEG) needs to be more clearly defined in order to address the multiple challenges of climate change from a UNCCD perspective. The following chapter of this volume therefore aims to lay the groundwork for further analyses by introducing the concept of *global governance architecture* (GGA) and assessing the current state of GEG. The third chapter explores the mandate, organizational structure and policies of the UNCCD within the context of GEG. Particular emphasis will be given to the challenges and opportunities facing sub-Saharan Africa. To obtain a better understanding of the role of science in the UNCCD process, the third chapter also provides necessary background information on relevant terms and describes the dynamic causal patterns of DLDD as well as methods to prevent or reverse these trends. Subsequently, chapter four seeks to bridge the gap between the 'land and climate community' in two ways. Firstly, by identifying the biophysical correlations between climate change and DLDD in order to provide a solid basis for policy development. Secondly, by identifying the social, political and economic drivers behind both phenomena. In the following, the case of biofuels will be used to demonstrate how multiple drivers of change amplify each other through interdependent feedback loops. The fourth chapter then concludes by addressing possible synergies and conflicts between existing policy frameworks for land, soil, and climate change.

It is, however, noteworthy that the difficulty of acquiring a command of local and regional conditions makes it very challenging to construct a framework for comprehensive approaches. Comprehensive social science research concerned with the structure of dryland populations is still rare and has been insufficiently linked to research on the *Millennium Development Goals* (MDGs)²⁸ so far, although most countries located in dryland regions are particularly af-

27 Cf. Len BERRY / Elena ABRAHAM / Wafa ESSAHLI: UNCCD Recommended Minimum set of Impact Indicators. Consultancy report. UNCCD 2009. Available at <<http://www.unccd.int/science/menu.php?newch=141>>.

28 "The eight Millennium Development Goals (MDGs) – which range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 – form a blueprint agreed to by all the world's countries and all the world's leading development institutions. They have galvanized unprecedented efforts to meet the needs of the world's poorest." For further detail, see: United Nations (n. d.): A Gateway to the UN System's Work on the MDGs, in: <<http://www.un.org/millenniumgoals/>> (31.03.2011), n. p.

fectured by poverty, environmental stress, conflict and migration.²⁹ These limitations notwithstanding, the following overarching questions will be addressed within the scope of this volume: (1) can ‘ecosystem-based approaches’ to land, soil and climate change contribute to environmental policy integration and create global benefits?³⁰ (2) What are the problems and pitfalls of addressing the economic dimension of DLDD and ecosystem services? As a final point, selected policy recommendations are presented and discussed. The content of this volume is based on a broad and interdisciplinary body of literature, reaching from official publications of the United Nations and other relevant institutions to both natural and social science publications. Given the fact that hundreds of articles, papers and books are issued on the subjects of desertification and climate change each year, it nevertheless goes beyond the scope of this volume to provide a complete in-depth review of the literature in these fields.³¹ Bearing in mind these considerations, an interview with Sergio Zelaya, Coordinator of the *Policy Advocacy and Global Issues Unit* (PAGI) of the UNCCD Secretariat, has been conducted in order to complement the methodological approach of this analysis and include valuable practical expertise. The overall goal of this volume is to foster an integrated understanding of the social, political and biophysical implications of climate change and DLDD and to illustrate the current state of knowledge from a multidisciplinary perspective.

29 Cf. Jann LAY: MDG Achievements, Determinants, and Resource Needs: What Has Been Learnt? (GIGA German Institute of Global and Area Studies Working Paper Series No 137). Hamburg 2010, p. 11-26. See also: Sören SCHOLVIN: Emerging Non-OECD Countries: Global Shifts in Power and Geopolitical Regionalization (GIGA German Institute of Global and Area Studies Working Paper Series No 128). Hamburg 2010, p. 22. Both papers are available at <<http://www.giga-hamburg.de/workingpapers>>. *For analytical purposes, the term ‘actors’ will be used synonymously with either all or selected forces, individuals and institutions that are relevant in a given context.*

30 “An ecosystem is a collection of plants, animals, and micro-organisms interacting with each other and with their non-living environment. Examples include a rainforest, desert, coral reef, or a cultivated system. A city can be treated as an urban ecosystem. Ecosystem services are the benefits that people get from nature. Examples include fresh water, timber, climate regulation, recreation, and aesthetic values.” For further detail, see: Janet RANGANATHAN et al.: *Ecosystem Services. A Guide for Decision Makers*. World Resources Institute 2008, p. 13.

31 *For detailed statistics on the number of relevant publications, see: VERSTRAETE et al., loc. cit., p. 107.*

2 Global Environmental Governance

2.1 Fragmented Global Governance: Towards an Analytical Approach

Given the multitude of complex challenges the world is facing at the beginning of the 21st century, the need for coherent systems of governance has never been more evident. Numerous perspectives on the nature of governance exist in the academic community, reflecting different disciplinary perspectives and specific concerns. According to a widespread definition employed by the *Commission on Global Governance*, governance is defined as “the sum of the many ways individuals and institutions, public and private, manage their common affairs”, and “a continuing process through which conflicting or diverse interests may be accommodated and cooperative action may be taken”.³² Against this background, ‘global’ governance can be best described as the phenomenon of “transboundary activities that are increasingly subject to hybrid forms of governance”.³³ The *analytical* use of the term global governance nevertheless demands the introduction of distinct categories. These categories have to consider the functioning and impact of drivers and constellations which generate or influence political regulation on a global scale.³⁴ In view of the necessity to systematically analyze global governance in different

32 Commission on Global Governance (CGG): *Our Global Neighborhood*, p. 7. Available at <<http://www.reformwatch.net/fixers/168.pdf>>. *According to the CGG, governance is defined as “the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and cooperative action may be taken. It includes formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interest.”*

33 Ulrich BRAND / Christoph SCHERRER: *Contested Global Governance: Konkurrierende Formen und Inhalte globaler Regulierung*. Vienna (n. d.), p. 2. Available at <<http://www.renner-institut.at>>.

34 Cf. BRAND / SCHERRER, loc. cit., p. 4. *The ‘political’ as a core subject refers to three dimensions: the struggle for power (‘politics’ - the process-related dimension) within a system of rules, institutions, and norms (‘polity’ - the institutional dimension) to be exercised in order to achieve given outcomes (‘policy’ - the content-related dimension)*. For further detail, see: “Politisches System”, in: Uwe ANDERSEN / Wichard WOYKE (eds.): *Handwörterbuch des politischen Systems der Bundesrepublik Deutschland*. Fünfte, aktualisierte Auflage. Opladen 2003, p. 528-532, p. 530.

fields of world politics, the concept of GGA provides a useful framework. It describes the “overarching system of public and private institutions – that is, organizations, regimes and other forms of principles, norms, regulations and decision-making procedures – that are valid or active in a given issue area of world politics”.³⁵ Global governance architecture can thus be considered as the “meta-level” of global governance pertaining to a particular issue area.³⁶ Respectively, the concept of GGA is more narrowly defined than the notion of ‘international order’, which comprises the organization of the entire system of international relations.³⁷ Moreover, the term ‘international order’ often conveys an optimistic outlook regarding systemic coherence and coordination.³⁸ By contrast, the concept of GGA also accounts for dysfunctional and non-intended effects, since it neither assumes an *a priori* existing state of ‘international order’ nor an international trend towards order.³⁹ It includes conflicts and synergies between institutions, between norms and principles that influence these institutions and between the overarching norms and principles that govern these interactions.⁴⁰ In this respect, the concept of GGA identifies

35 Frank BIERMANN et al.: The architecture of global climate governance: setting the stage, in: Frank BIERMANN / Philipp PATTERBERG / Fariborz ZELLI (eds.): Global Climate Governance Beyond 2012. Architecture, Agency and Adaptation. Cambridge 2010, p. 13-24, p. 16. *International regimes can be defined as “sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors’ expectations converge in a given area of international relations”*. See: Stephen D. KRASNER: Structural causes and regime consequences: regimes as intervening variables, in: Id. (ed.): International regimes. Ithaca, NY 1983, p. 1-21, p. 2. *International institutions, as the more generic term, comprise international regimes, organizations and implicit norms and principles*. See: Robert O. KEOHANE: International Institutions and State Power: Essays in International Relations Theory. Boulder 1989, p. 3-4.

36 BIERMANN et al.: Architecture, loc. cit., p. 16.

37 Cf. id.: Fragmentation of Global Governance Architectures. The Case of Climate Policy (Global Governance Working Paper No 34). Amsterdam et al. 2007, p. 2. Available at <<http://www.glogov.org/images/doc/WP34.pdf>>. See also: Hedley BULL: The Anarchical Society: A Study of Order in World Politics. New York 1977.

38 Cf. Stefan JUNGCURT: Institutional Interplay in International Environmental Governance. Policy Interdependence and Strategic Interaction in the Regime Complex on Plant Genetic Resources for Food and Agriculture. Aachen 2008, p. 19.

39 Cf. BIERMANN et al.: Architecture, loc. cit., p. 16-17.

40 Cf. id.: Fragmentation, loc. cit., p. 2. *‘Norms’, in short, carry moral and ethical imperatives and relate to the powers, rights, and duties of the individual state, which aid in identifying expected roles and anticipated conduct from others in the international system. Importantly, norms may be embodied in formal rules (i.e. explicit norms) or presented as informal understandings (i.e. implicit norms). In either event, norms prescribe desirable social goals for the international community and set the means that are acceptable for achieving them. ‘Principles’ refer to fundamental tenets or truths that are generally believed and serve as a guide for state conduct. Principles supply for states the [...]*

fragmentation as one of the fundamental problems of global governance architectures.⁴¹ International responsibilities and activities in particular issue areas are spread across multiple institutions that are different in their character (organizations, regimes and implicit norms), their constituencies (public and private), spatial scopes (from local to global) and subject matters (from specific policy fields to universal concerns).⁴² Consequently, international institutions are interconnected with regulatory mechanisms operating on a global, national, regional and local scale and thus embedded in trans-scalar modes of regulation.⁴³ Fragmentation, in other words, can be perceived as an inherent structural characteristic of global governance architectures on both a horizontal and vertical level. Non-fragmented, ‘universal’ architectures would only be empirically traceable, if all public and private institutions relevant in an issue area are “subject to the same regulatory framework, participate in the same decision-making procedures, and agree on a core set of common commitments”.⁴⁴

Such a situation, however, is still a theoretical postulate. Even though the UNCCD, for example, has been ratified by 194 Parties (March 2011) and thus benefits from its near universal membership, particular aspects of DLDD such as agriculture, ecosystem management and rural development are not dominated or regulated by a single GGA. Moreover, several international institutions in the *Environmental Management Group* are concerned with the issue of desertification, among them the World Bank, the Convention on Biological Diversity (CBD), the International Panel for Climate Change (IPCC), the United Nations Environment Program (UNEP), the United Nations Development Program (UNDP), and the International Fund for Agricultural Development (IFAD).⁴⁵ Against this background, distinct categories have to be

[...] rules for international codes of conduct. When used as the basis of state behavior, principles can evolve into comprehensive and fundamental law. Principles widely adhered to may become fundamental truths and hence, accepted legal doctrine. See: Christopher C. JOYNER: Rethinking International Environmental Regimes: What Role for Partnership Coalitions?, in: Journal for International Law and International Relations 1 (2005) 1-2, p. 89-120, p. 90-91.

41 Cf. Daniel C. ESTY: Revitalizing Global Environmental Governance for Climate Change, in: *Global Governance* 15 (2009), p. 427-434, p. 427.

42 Cf. BIERMANN et al.: *Architecture*, loc. cit., p. 16.

43 Cf. Barry CARIN / Jan Aart SCHOLTE / Gordon SMITH: Editorial Exit, in: *Global Governance* 15 (2009), p. 559-565, p. 559.

44 BIERMANN et al.: *Architecture*, loc. cit., p. 17.

45 *For a full list, see:* Maria IVANOVA / Jennifer ROY: The Architecture of Global Environmental Governance: Pros and Cons of Multiplicity, in: Lydia SWART / Estelle PERRY (eds.): *Global Environmental Governance: Perspectives on the Current Debate*. New York 2007, p. 48-66, p. 58-61.

employed to assess the degree and consequences of fragmentation in crosscutting policy domains and allow for the comparative analysis of overlapping global governance architectures. In order to distinguish between different degrees of fragmentation, three ideal types can be defined: (1) synergistic fragmentation, (2) cooperative fragmentation, and (3) conflictive fragmentation.⁴⁶

According to BIERMANN et al., a situation of *synergistic fragmentation* exists when a single core institution involves (almost) all relevant actors, and provides for effective and detailed general principles that regulate policies in distinct yet substantially integrated institutional arrangements.⁴⁷ A situation of *cooperative fragmentation* exists when a particular issue area is dominated by different institutions and decision-making procedures that are loosely integrated. Under this scenario, the core institution does not involve all institutions and actors that are relevant in the respective issue area. Moreover, the relationship between norms and principles of different institutions remains ambiguous. In this case, policies in a particular issue area are defined, decided and monitored through different institutions, or through the core institution and individual actors that are not part of this institution. Nevertheless, the overall integrative capacity within the governance architecture is still sufficient to prevent open conflict. Finally, a situation of *conflictive fragmentation* can be observed when different and largely unrelated institutions with a diverse membership have conflictive sets of principles, norms, rules, and decision-making procedures. Under this scenario, institutions are driven by actor coalitions that accept these conflicts or even advance them. These ideal types of fragmentation, however, will hardly ever be clear-cut in empirical research and are by no means mutually exclusive. The boundaries between conflictive and cooperative fragmentation, for instance, may be difficult to determine in some cases.⁴⁸ Instead, they serve as a blueprint to obtain a better understanding of the interlinked causes, consequences and dynamics of fragmentation within and across distinct governance architectures.⁴⁹ Against this background, the following section aims to shed light on the overall setting in which environment-related actors and institutions exist and interact.

46 Cf. BIERMANN et al.: Architecture, loc. cit., p. 18.

47 Cf. *ibid.*, p. 19.

48 Cf. BIERMANN et al.: Fragmentation, loc. cit., p. 4.

49 Cf. *ibid.*

Table 1: Typology of Fragmented Governance Architectures

	Synergistic	Cooperative	Conflictive
Institutional nesting	One core institution, with other institutions being closely integrated	Core institutions with other institutions being loosely integrated	Different, largely unrelated institutions
Norm conflicts	Core norms of institutions are integrated	Core norms are not conflicting	Core norms conflict
Actor constellations	All relevant actors support the same institutions	Some actors remain outside main institutions, but maintain cooperation	Major actors support different institutions

(Source: BIERMANN et al.: Fragmentation, loc. cit., p. 18.)

2.2 The Architecture of Global Environmental Governance

On June 5, 1972, the *United Nations Conference on the Human Environment* (UNCHE) convened in Stockholm, beginning the era of GEG.⁵⁰ As a result of this conference, the United Nations Environment Programme (UNEP) was formed.⁵¹ At its inception, UNEP was created to serve as the leading or ‘anchor’ institution for the global environment, but has done so with only moderate success.⁵² At present, international responsibilities and activities in the field of environmental governance are spread across multiple institutions

50 Cf. Andreas RECHKEMMER: International Environmental Governance. Issues, Achievements and Perspectives (Studies of the University: Research, Counsel, Education Publication Series of UNU-EHS No. 3). United Nations University 2006, p. 10. Available at <<http://www.ehs.unu.edu/file/get/3907>>.

51 Cf. Steve CHARNOVITZ: A World Environment Organization (International Environmental Governance, Gaps and Weaknesses/Proposals for Reform, UNU-IAS Working Paper). Tokyo 2002, p. 8.

52 Cf. Maria IVANOVA: Can the Anchor Hold? Rethinking the United Nations Environment Programme for the 21st Century (Yale F&ES Publication Series Report Number 7). Yale 2005, p. 7. Available at <http://environment.research.yale.edu/documents/downloads/o-u/report_7_unep_evaluation.pdf>.

and actors that run the gamut from sovereign states to interstate organizations and non-state bodies such as non-governmental organizations (NGOs) and private business companies.⁵³

Within the United Nations system in particular, environmental affairs are handled by (1) specialized agencies; (2) organizations, commissions, funds, research and training institutes, and other entities that are either free-standing or related to the United Nations Economic and Social Council (ECOSOC), General Assembly or Secretariat; and by (3) associated financing mechanisms such as the *Global Environment Facility* and the *Global Mechanism*.⁵⁴ Additionally, more than 500 multilateral environmental agreements (MEAs) have emerged as a technique to regulate state behavior and a consensual approach to norm

53 The term 'interstate organizations' includes fully international organizations such as the United Nations whose membership is (near) universal and whose 192 members are sovereign states. It also comprises other interstate bodies whose members are countries ('countries' meaning sovereign states and other entities such as the Cook Islands) and whose membership is more exclusive. Examples are the World Trade Organization (WTO) and the North Atlantic Treaty Organization (NATO). For the purpose of this analysis, however, transgovernmental networks that group around issues (clubs) will be included. 'Non-state bodies' include, for instance, different types of NGOs; business companies and associations; trade unions; scientific networks such as independent think tanks and institutes; independent financial mechanisms; and religious groups such as churches. See: Nigel DOWER: *World Ethics: The New Agenda* (Edinburgh Studies in World Ethics). Second Edition. Edinburgh 2007, p. 192-195. For an in-depth analysis of the 'club model', see: Robert O. KEOHANE / Joseph S. NYE: *Between Centralization and Fragmentation: The Club Model of Multilateral Cooperation and Problems of Democratic Legitimacy* (Kennedy School of Government Working Paper 01-004). Harvard 2001, p. 3-6.

54 United Nations specialized agencies include, for instance, the Food and Agriculture Organization of the United Nations (FAO) and the World Bank Group (WBG). The 'Global Environment Facility' (GEF) unites 182 member governments - in partnership with international institutions, non-governmental organizations, and the private sector - to address global environmental issues. As an independent financial organization, the GEF provides grants to developing countries and countries with economies in transition for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants. The GEF also serves as financial mechanism for the following conventions: UNFCCC, CBD, UNCCD, and the Stockholm Convention on Persistent Organic Pollutants. Furthermore, the GEF supports the implementation of the Montreal Protocol on Substances That Deplete the Ozone Layer in countries with economies in transition. See: The Global Environment Facility (n. d.): What is the GEF?, in: <<http://www.thegef.org/gef/whatisgef>> (31.03.2011), n. p. As a subsidiary body of the UNCCD, the 'Global Mechanism' provides financial advisory services to developing country Parties in order to assist them in up-scaling public finance and private sector investments in sustainable land management and rural development activities. See: The Global Mechanism (n. d.): Who we are, in: <<http://global-mechanism.org/about-us/who-we-are>> (31.03.2011), n. p.

setting.⁵⁵ In view of the difficulties that result from this extensive fragmentation within the architecture of global environmental governance, UNEP has recently begun working on a new strategic vision. The UNEP *Medium-term Strategy 2010-2013* stresses the importance of a sound and authoritative scientific base as well as the need to enhance cooperation with convention secretariats, other United Nations entities and non-state bodies such as NGOs and scientific networks (sometimes referred to as “epistemic communities”).⁵⁶

In this context, the phenomenon of “agency beyond the state” has become increasingly important.⁵⁷ *Agency*, meaning “authority and capacity to govern people and issue areas”, is neither fully located in the public sphere of sovereign states and interstate organizations nor in the private sphere of non-state bodies.⁵⁸ It rather emerges as a mixture of public and private authority and capacity.⁵⁹ Empirical analyses of non-state body influence, for instance in the case of the UNFCCC and UNCCD, have shown that a substantial influence (e.g. the intentional transmission of information that leads to alterations in behavior in response to that information) of non-state bodies can be observed

55 For exact numbers, see: Norichika KANIE: Governance with Multilateral Environmental Agreements: A Healthy or Ill-Equipped Fragmentation?, in: Lydia SWART / Estelle PERRY (eds.): *Global Environmental Governance: Perspectives on the Current Debate*. New York 2007, p. 67-86, p. 58-61. Available at <<http://www.centerforunreform.org/node/251>>.

56 Cf. Maria IVANOVA: UNEP in Global Environmental Governance: Design, Leadership, Location, in: *Global Environmental Politics* 10 (2010) 1, p. 30-59, p. 54. *The term ‘epistemic community’ often implies a value-based bias. Therefore, the neutral term ‘scientific network’ will be used.*

57 Johannes STRIPPLE / Philipp PATTBURG: Agency in global climate governance: setting the stage, in: Frank BIERMANN / Philipp PATTBURG / Fariborz ZELLI (eds.): *Global Climate Governance Beyond 2012. Architecture, Agency and Adaptation*. Cambridge 2010, p. 137-145, p. 137-138.

58 Ibid., p. 142. See also: Rodney Bruce HALL / Thomas J. BIERSTEDER: The emergence of private authority in the international system, in: Rodney Bruce HALL / Thomas J. BIERSTEDER (eds.): *The Emergence of Private Authority in Global Governance*, p. 3-22, p. 3-5.

59 Cf. STRIPPLE / PATTBURG, loc. cit., p. 138.

in regard to the political ‘outcomes’ of environmental negotiations.⁶⁰ Conceptualizing agency along a clear-cut distinction between the public and private sphere is therefore not helpful in determining where agency can be found. The involvement of non-state bodies in the architecture of GEG demands a new view on how agency is distributed at multiple levels. Today, actors are increasingly connected in transnational or transgovernmental *networks*, and work through a variety of competing and cooperating coalitions.⁶¹ At the same time, none of these components can be entirely separated from each other, since the involvement of non-state bodies in decision-making procedures, the formation of networks, and linkages among issues are “inherently connected processes”.⁶²

Until recently, however, traditional approaches to international politics regarded sovereign states as not only the principle authority but also the only *legitimate* authority.⁶³ Moreover, the presumption prevailed that there is a fun-

60 Michele M. BETSILL / Elisabeth CORELL: NGO Influence in International Environmental Negotiations: A Framework for Analysis, in: *Global Environmental Politics* 1 (2001) 4, p. 65-85, p. 74-79. See also: Michele M. BETSILL / Elisabeth CORELL: A Comparative Look at NGO Influence in International Environmental Negotiations: Desertification and Climate Change, in: *Global Environmental Politics* 1 (2001) 4, p. 86-107, p. 96-106; and: Karl-Werner BRAND / Fritz REUSSWIG: The social embeddedness of global environmental governance, in: Gerd WINTER (ed.): *Multilevel Governance of Global Environmental Change. Perspectives from Science, Sociology and the Law*, p. 79-105, p. 96.

61 Cf. KEOHANE / NYE, loc. cit., p. 9. ‘*Transnational*’ refers to relationships between (1) the governments of countries and non-state bodies; between (2) interstate organizations and non-state bodies; between (3) non-state bodies in different countries; and (4) between societies and/or individuals in general. See also: Anne-Marie SLAUGHTER: *A New World Order*. Princeton 2004, p. 19 and 44; and: Paul W. THURNER / Martin BINDER: EU Transgovernmental Networks: The Emergence of a New Political Space beyond the Nation State?, in: *European Journal of Political Research* 48 (2009) 1, p. 80-106, p. 80-84. *In line with the club model, Anne-Marie SLAUGHTER argues that ‘transgovernmental networks’ replace the state formerly conceived as a hierarchical unitary actor. These networks are comprised of government officials and are considered to emerge spontaneously, remaining flexible and informal, or they institutionalize as or within interstate organizations or non-state bodies.*

62 KEOHANE / NYE, loc. cit., p. 9.

63 Cf. STRIPPLE / PATTERBERG, loc. cit., p. 141. See also: Vesselin POPOVSKI / Nicolas TURNER: *Legality and Legitimacy in International Order* (UNU Policy Brief No. 5). United Nations University 2008, p. 3. “*Legitimate decisions are based in democratic participation whereby affected persons have the opportunity to raise their voices. When legitimacy is separated from democratic participation, it risks being exposed to ideological and selfconcerned manipulation.*”

damental difference between the domestic domain and the domain of international politics.⁶⁴ These notions originate from Weberian conceptions of the state.⁶⁵ For Max Weber, the essence of the state is its ability to claim “the monopoly of the legitimate use of physical force within a given territory”.⁶⁶ Authority can thus be defined as “legitimized power”.⁶⁷ Having legitimacy in turn “implies that there is some form of normative, uncoerced consent or recognition of authority on the part of the regulated or governed”.⁶⁸ This consent is perceived to be “the product of persuasion, trust, or apathy, rather than coercion”.⁶⁹ Consequently, many states “can rely on the habitual obedience of their citizens by establishing legal codes in which the thread of physical coercion is only implicit”.⁷⁰ For a long time, this ability to rely on legitimate authority for habitual obedience has been seen as largely absent in the domain of international politics.⁷¹

This notwithstanding, examples of non-state body influence show, for instance in the case of MEAs, that there are possibilities for the emergence of *legitimate agency beyond the state*.⁷² Non-state bodies operate in multiple domains: public and private, sub-national, national, regional, and within interstate organizations and transnational networks. They join governments in putting international norms into practice, for instance as “quasi-implementing agencies for development assistance programmes administered by the World Bank or bilateral agencies”.⁷³ Moreover, they do not exclusively rely on the actions or

64 Cf. HALL / BIERSTEKER, loc. cit., p. 3.

65 Cf. *ibid.*

66 Max WEBER: *Politik als Beruf* (Geistige Arbeit als Beruf. Vier Vorträge vor dem Freistudentischen Bund. Zweiter Vortrag). Munich / Leipzig 1919, p. 4. The original quote reads as follows: “*Staat ist diejenige menschliche Gemeinschaft, welche innerhalb eines bestimmten Gebietes – dies: das ‘Gebiet’, gehört zum Merkmal – das Monopol legitimer physischer Gewaltsamkeit für sich (mit Erfolg) beansprucht.*”

67 HALL / BIERSTEKER, loc. cit., p. 3.

68 *Ibid.*, p. 4-5. ‘Normative’ refers to the way something ought to be done according to a certain value position (i.e. norms). See page 16-17 of this volume.

69 *Ibid.*, p. 5.

70 Michael Joseph SMITH: *Realist Thought from Weber to Kissinger*. Baton Rouge / London 1986, p. 25.

71 Cf. HALL / BIERSTEKER, loc. cit., p. 3.

72 Cf. STRIPPLE / PATTERBERG, loc. cit., p. 141-142. *Yet authority or agency ‘beyond the state’ does not necessarily mean ‘without the state’.*

73 Frank BIERMANN: *Earth System Governance. The Challenge for Social Science* (Global Governance Working Paper No 19). Amsterdam et al. 2006, p. 18. Available at <http://www.world-governance.org/IMG/pdf_0088_Earth_System_Governance-2.pdf>.

support of states and are recognized as legitimate authorities by a larger public that often includes states themselves.⁷⁴ Even theoretical concepts that perceive sovereign states as hierarchical unitary actors acknowledge the agency of non-state bodies such as scientific networks. Today, non-state bodies perform a variety of tasks traditionally associated with the sovereign state and profoundly challenge its authority, sovereignty and territoriality.⁷⁵

Yet there is a much more fundamental element to the problem of legitimate agency. Both, interstate organizations and non-state bodies active in the issue area of GEG frequently lack the democratic legitimacy that stems from elections, transparent decision-making processes, and institutional arrangements facilitating accountability and public participation.⁷⁶ Most notably, transnational and transgovernmental networks, despite their claims to be democratically legitimated, tend to be “self-selected and [...] unrepresentative elites”.⁷⁷ In some cases, networks might even take agency out of the hands of elected government officials and place it into the hands of bureaucrats “that are not controlled or closely guided by the policies of the cabinets or chief executives”.⁷⁸ To further illustrate this legitimacy dilemma, *Conferences of the Parties* (COPs), that is regular negotiations of the Parties to MEAs, may serve as a good example. According to an ‘interactional’ account of international law, COP meetings can be perceived as legitimate fora to institutionalize democratic participation in international law-making processes.⁷⁹

74 Cf. HALL / BIERSTEKER, loc. cit., p. 4.

75 James N. ROSENAU: Distant proximities: dynamics beyond globalization. Princeton 2003, p. 65-78. See also: John Gerard RUGGIE: Territoriality and Beyond: Problematizing Modernity in International Relations, in: *International Organization* 47 (Winter, 1993) 1, p. 139-174, p. 171-174. John G. RUGGIE employs the term ‘unbundled territoriality’ to systematically explore the condition of postmodernity in international politics.

76 Cf. KEOHANE / NYE, loc. cit., p. 14.

77 Ibid.

78 Robert O. KEOHANE / Joseph S. NYE: Transgovernmental Relations and International Organizations, in: *World Politics* 27 (1974) 1, p. 39-62, p. 43. See also: Anne-Marie SLAUGHTER / Thomas HALE: Transgovernmental Networks and Emerging Powers, in: Alan S. ALEXANDROFF / Andrew F. COOPER (eds.): *Rising States, Rising Institutions: Challenges for Global Governance*. Washington 2010, p. 48-62, p. 56.

79 Stephen BERNSTEIN: Legitimacy in Global Environmental Governance, in: *Journal of International Law and International Relations* 1 (2005) 1-2, p. 139-166, p. 155. *The ‘interactional’ theory assumes that regular interaction and cooperation between actors within the context of established norms and institutions makes rules understandable, creates stable expectations, and facilitates the acceptance of norms.*

Most of these meetings are regularly attended by a large variety of experts, non-state body representatives, staff members of interstate organizations and government officials.⁸⁰ In spite of these ideal circumstances, however, the transparency, accountability and legitimacy of COP meetings can be called into question. On the one hand, non-state-bodies themselves are neither entirely representative nor completely detached from overarching economic, social and political systems. Basically, they are bound by the regulatory environments of sovereign states and interstate processes such as the ‘rules for accreditation’ at COP meetings. On the other hand, interstate organizations and related networks, by limiting the access to negotiations or to certain parts of the negotiation process, might as well use the resources of selected non-state bodies to strengthen their own positions.⁸¹ Given these considerations, any analysis concerned with the problem of a fragmented GEG architecture has to answer – at least partly – the complex question of how agency is distributed or acquired, legitimated, maintained, and used. In 1973, Robert W. COX and Harold K. JACOBSEN have therefore shown remarkable vision by coining the term “anatomy of influence” to describe the fragmented networks that are intrinsically linked to the architecture of GEG.⁸²

Until today, however, no consensus has been reached about the advantages and disadvantages of fragmentation, although the consequences of fragmentation have by now been widely conceptualized in different fields of academic research.⁸³ As yet, different predictions range from a positive assessment of fragmentation in terms of fruitful competition and multiplicity, to a rather negative view in terms of hampering communication and coordination.⁸⁴ It is nevertheless futile, as James N. ROSENAU argues, to “differentiate the macro sources of frammegrative [sic] dynamics from their consequences”, since “the outcomes of interaction sequences instantaneously feed back to generate

80 *For further information, see:* United Nations Non-Governmental Liaison Service (UN-NGLS) (n. d.): Website, in: <<http://www.un-ngls.org/spip.php?page=cscp>> (31.03.2011), n. p.

81 Kal RAUSTIALA: States, NGOs, and International Environmental Institutions, in: *International Studies Quarterly* 41 (1997), p. 719-740, p. 719.

82 Robert W. COX / Harold K. JACOBSEN (eds.): *The Anatomy of Influence: Decision Making in International Organization*. New Haven 1973.

83 Cf. Fariborz ZELLI et al.: The consequences of a fragmented climate governance architecture: a policy appraisal, in: Frank BIERMANN / Philipp PATTERBERG / Fariborz ZELLI (eds.): *Global Climate Governance Beyond 2012. Architecture, Agency and Adaptation*. Cambridge 2010, p. 25-34, p. 25-26. See also: KEOHANE / NYE, loc. cit., p. 7-16; and: BIERMANN et al.: Fragmentation, loc. cit., p. 15.

84 Cf. IVANOVA / ROY: Multiplicity, loc. cit., p. 49-50.

other outcomes”.⁸⁵ In other words, any assessment that employs simplistic cause/effect paradigms to explain fragmentation within the architecture of GEG seems to be inherently problematic due to the simultaneity of causes and effects. Thus, the increasing degree of fragmentation, albeit a serious problem, is only but one aspect of the interdependent yet equally important challenges that GEG faces at the beginning of the 21st century.

In summary, the key problem areas which have been identified so far can be split into five parts: (1) *fragmentation*, (2) *deficient expertise*, (3) *deficient agency*, (4) *insufficient legitimacy*, and (5) *failed collective action*.⁸⁶ While institutional fragmentation frequently leads to insufficient knowledge management as well as knowledge gaps in crosscutting issue areas, diverging methodologies within a wide array of institutions may lead to difficulties in comparing research results.⁸⁷ Furthermore, institutions within the United Nations system often have diffuse or conflicting mandates. They compete for time, attention and resources – not only within the system but also beyond. Due to multiple reasons such as limited political support, small budgets and vague mandates, neither UNEP nor any other institution has so far been able to serve as a global authority for GEG.⁸⁸ In addition, the orientation of many people towards non-state actors and a deep sense of moral disillusionment and “normative abandonment” in societies make it ever more difficult to legitimate and obtain authority.⁸⁹

85 ROSENAU, loc. cit., p. 50. James N. ROSENAU uses the term ‘framegration’ (a combination of ‘fragmentation’ and ‘integration’) to signify a theoretical outlook that attempts to examine dynamics at the micro and macro level simultaneously. It aims to describe localizing, decentralizing and fragmenting dynamics on the one hand, and globalizing, centralizing and integrating dynamics on the other hand. This concept, however, is less useful as an analytical category, since it is likely to merge into either synergistic, cooperative, or conflictive fragmentation. It is, nevertheless, of vital importance to understand the ‘interactive feedback loops’ in which these types of fragmentation are embedded.

86 Cf. Daniel C. ESTY / Maria IVANOVA: Making International Environmental Agreements Work: the Case for a Global Environmental Organization (Yale Center for Environmental Law and Policy Working Papers Series Working Paper 2/1). May 2001.

87 Cf. Barbara GEMMILL / Maria IVANOVA / Chee Yoke LING: Designing a New Architecture for Global Environmental Governance (International Institute for Environment and Development World Summit Briefing Papers). London 2002, p. 1-2. Available at <<http://www.iied.org/pubs/pdfs/11023IIED.pdf>>.

88 Cf. *ibid.*, p. 2.

89 Margaret Urban WALKER: Moral repair: reconstructing moral relations after wrongdoing. Cambridge 2006, p. 20. In moral philosophy, ‘normative abandonment’ refers to a situation in which “the community or authority to whom the victim looks for validation and vindication ignores the victim, challenges the victim’s credibility, treats the victim’s complaint as of little import, shelters or sides with the perpetrator of wrong, or, worse, overtly or by implication blames the victim”.

These examples clearly illustrate that “interdependent feedback loops” are an integral part of the shortcomings that put the current architecture of GEG under considerable strain.⁹⁰ Moreover, three aspects have to be taken into account to better understand the dynamics behind the aforementioned key problem areas. First, no single state, no matter how powerful, can guarantee success in protecting his population from global threats such as climate change. Second, “we have gone overboard in our enthusiasm for non-state actors”.⁹¹ NGOs, scientific networks and private business companies will not be able to address global problems on their own. Third, recurrent problems will not be solved by *ad-hoc* approaches and short-term thinking either. Feasible solutions require vision and credible leadership as well as predictable and institutionalized responses of interstate organizations.

See also: RORTY, Richard: Justice as a Larger Loyalty, in: Matthew FESTENSTEIN / Simon THOMPSON (eds.): Richard Rorty. Critical dialogues. Cambridge 2001, p. 223-237, p. 223. “*The tougher things get, the more ties of loyalty to those near at hand tighten, and the more those to everyone else slacken.*”

90 ROSENAU, loc. cit., p. 50.

91 Thomas G. WEISS: What’s Wrong with the United Nations and How to Fix it. Cambridge 2009, p. 227.

3 The UNCCD in the Context of Global Environmental Governance

3.1 The UNCCD Mandate: Combating Desertification, Land Degradation and Drought (DLDD)

3.1.1 Definitions and Affected Areas

Desertification is a complex global phenomenon that can be best described in terms of multiplicity.⁹² The causes and consequences of desertification are connected by interdependent feedback loops and vary considerably in regard to their spatial, temporal and social scales.⁹³ However, despite these difficult conditions and the frequently emphasized view that desertification “is not defined in a coherent manner”, there are adequate scientific approaches to analyze the problem.⁹⁴ The most authoritative definition of desertification today is still provided by the UNCCD.⁹⁵ In the text of the Convention, *desertification* is defined as “land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities”.⁹⁶ The UNCCD defines *land degradation* as “reduction or loss, in arid, semi-arid and dry sub-humid areas, of the biological or economic productivity and complexity of rain fed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as: (i) soil erosion caused by wind and/or water; (ii) deterioration of the physical, chemical and biological or economic properties of soil;

92 Cf. Helmut J. GEIST / Eric F. LAMBIN: Dynamic Causal Patterns of Desertification, in: *BioScience* 54 (2004) 9, p. 817-829, p. 827.

93 Cf. *ibid.*

94 VERSTRAETE et al., loc. cit., p. 106. See also: Benno PILARDEAUX / Meinhard SCHULZ-BALDES: Desertification, in: José L. LOZÁN / Hartmut GRAßL / Peter HUPFER (eds.): *Climate of the 21st Century: Changes and Risks*. Second Edition. Hamburg 2001, p. 232-236, p. 233.

95 Cf. Helmut J. GEIST: *The Causes and Progression of Desertification*. Aldershot 2005, p. 2. See also: REYNOLDS / STAFFORD SMITH, loc. cit., p. 3; and: S.R. VERÓN et al.: Assessing Desertification, in: *Journal of Arid Environments* 66 (2006), p. 751-763, p. 752; WILLIAMS / BALLING, loc. cit., p. 15.

96 United Nations 1994, loc. cit., p. 5

and (iii) long-term loss of natural vegetation”.⁹⁷ *Land*, in this context, refers to “the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operate within the system”.⁹⁸ *Arid, semi-arid and dry sub-humid areas*, according to the UNCCD, means areas, “other than polar and sub-polar regions, in which the ratio of annual precipitation to potential evapotranspiration (i.e. the sum of evaporation and plant transpiration from the Earth’s land surface to atmosphere) falls within the range from 0.05 to 0.65”.⁹⁹

Put quite simply, the definition employed by the UNCCD limits the spatial dimension of desertification to certain *dryland areas*, although the phenomenon itself extends these boundaries. The dryland delineation of the UNCCD defines drylands according to an aridity index, calculated as the ratio of mean annual precipitation (P) to mean annual evapotranspiration (PET). In line with this aridity index, the world is divided into six aridity zones: (1) hyperarid, (2) arid, (3) semi-arid, (4) dry sub-humid, (5) humid, and (6) cold climates.¹⁰⁰ The UNCCD definition, however, covers only arid, semi-arid and dry sub-humid areas. The P/PET ratio in these areas ranges from 0.05-0.65. Hyperarid zones with a P/PET ratio <0.05 are excluded from this definition.¹⁰¹ Some definitions of dryland areas nevertheless include hyperarid zones, meaning regions such as the Atacama, Gobi, Arabian and Sahara deserts, which make up 6.6% of the world’s terrestrial area.¹⁰² By including these regions, all areas with a P/PET ratio less than 0.65 would be covered. This definition of drylands would encompass 41.3% of the world’s terrestrial area.¹⁰³

97 United Nations 1994, loc. cit., p. 5. “*Soils, forming the top layer of the Earth’s crust, are a mixture of mineral particles, organic matter, water, air and living organisms. Processes between these components perform vital functions within ecosystems [...] The dynamic soil system delivers functions and services vital for human societies and the environment. Soil is the basis for food and biomass production, and plays a central role as a habitat for biota and as a gene pool. Moreover, it stores, filters, buffers and transforms [...] water, inorganic and organic compounds, and is a major sink and source for greenhouse gases.*” See: W.E.H. BLUM / B.P. WARKENTIN / E. FROSSARD: *Soil, human society and the environment*, in: E. FROSSARD / W.E.H. BLUM / B.P. WARKENTIN (eds.): *Function of Soils for Human Societies and the Environment* (Geological Society London Special Publications 266). London 2006, p. 1-8, p. 1.

98 United Nations 1994, loc. cit., p. 5.

99 Ibid., p. 4. See also: Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 204.

100 Cf. REYNOLDS / STAFFORD SMITH, loc. cit., p. 3.

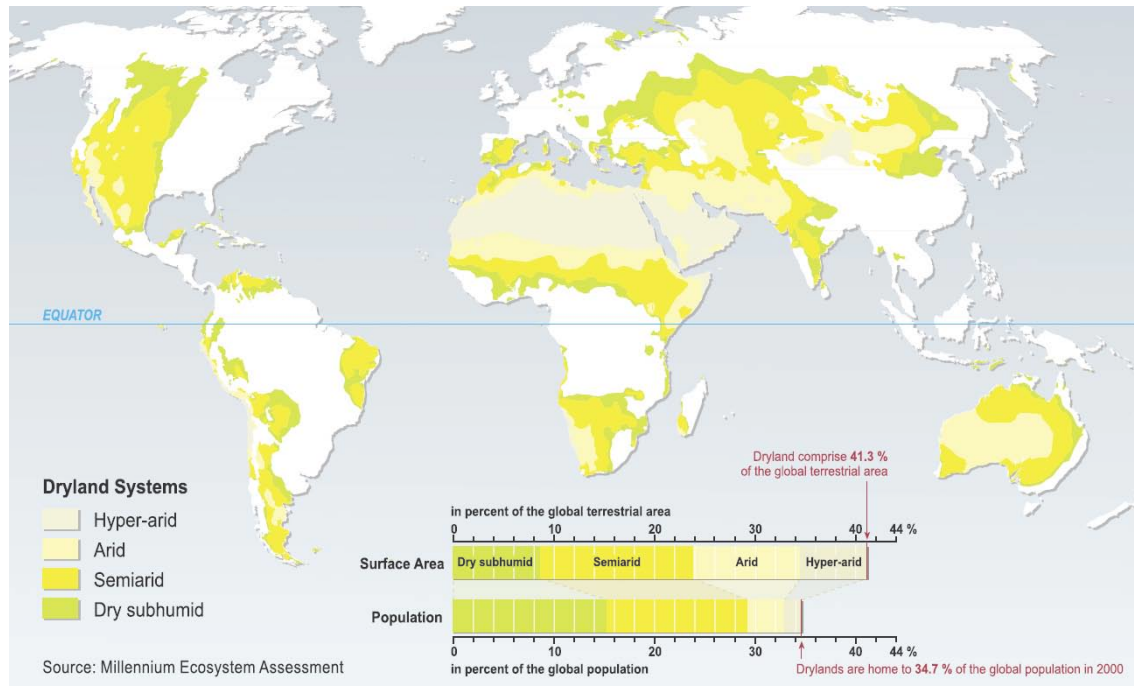
101 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 204.

102 Cf. United Nations Decade for Deserts and the Fight Against Desertification 2010: *Global Value*, in: <<http://unddd.unccd.int/global-value.htm>> (31.03.2011), n. p.

103 Cf. Millennium Ecosystem Assessment 2005, loc. cit., p. 23.

According to the UNCCD definition, relevant dryland areas cover 34.6% of the global terrestrial area.¹⁰⁴ Approximately 10 to 20% of these lands are affected by severe degradation.¹⁰⁵

Figure 1: Present-Day Drylands and Their Categories



(Source: Millennium Ecosystem Assessment 2005, loc. cit., p. 23.)

Within dryland areas, the production of wood, crops and other ecosystem services is limited by water availability.¹⁰⁶ Dryland areas are particularly threatened by highly variable precipitation, low precipitation levels, recurring drought, and thus unpredictable productivity of the resource base.¹⁰⁷ *Drought*, in this regard, can be defined as “the naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production

104 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 204.

105 Cf. Millennium Ecosystem Assessment 2005, loc. cit., p. 7 (*medium certainty*).

106 Cf. *ibid.*, loc. cit., p. 23.

107 Cf. Stefanie M. HERRMANN / Charles F. HUTCHINSON: The Scientific Basis: Links between Land Degradation, Drought and Desertification, in: Pierre Marc JOHNSON / Karel MAYRAND / Marc PAQUIN (eds.): *Governing Global Desertification. Linking Environmental Degradation, Poverty and Participation*. Aldershot 2006, p. 11-26, p. 12.

systems”.¹⁰⁸ Drought nevertheless has to be differentiated from aridity. While aridity is restricted to low-rainfall regions and characterized as a permanent feature of climate, drought is a temporary aberration and considered a slow-onset “*hydro-meteorological hazard*” that occurs in virtually all climatic zones.¹⁰⁹ The term hazard is defined as “a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage”.¹¹⁰ In terms of typologies, droughts are classified as meteorological, hydrological, agricultural, and socio-economic.¹¹¹ While meteorological drought is a natural event, resulting from climatic causes which differ from region to region, hydrological, agricultural and socio-economic droughts place the emphasis on human and social aspects.¹¹² Droughts can not only generate severe stress for the environment, but also for socio-economic systems, depending on the *vulnerability* of particular populations.¹¹³ Vulnerability is defined by the United Nations International Strategy for Disaster Reduction (UNISDR) as “the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of hazard”.¹¹⁴

Generally speaking, DLDD is occurring in drylands all over the world.¹¹⁵ The ISRIC Report 2008/01 points out that among the areas hardest hit by land degradation are Africa south of the Equator, Indo-China, Myanmar, Malaysia and Indonesia, southern China, Australia, the South American Pampas, and swaths of the high-latitude forest belt in North America and Siberia.¹¹⁶

108 United Nations 1994, loc. cit., p. 5.

109 United Nations International Strategy for Disaster Reduction (UNISDR) 2009: Drought Risk Reduction Framework and Practices. Contributing to the Implementation of the Hyogo Framework for Action, p. 8.

110 UNISDR 2009, loc. cit., p. viii.

111 Cf. *ibid.*

112 Cf. *ibid.*, p. 8-9. ‘*Hydrological drought*’ is defined by deficiencies in surface and subsurface water supplies. ‘*Agricultural drought*’ is defined by the lack of availability of soil water to support crop and forage growth. ‘*Socio-economic drought*’ reflects the relationship between supply and demand for a certain commodity or economic good (such as livestock forage, or hydroelectric power) that is dependent on precipitation.

113 Cf. HERRMANN / HUTCHINSON, loc. cit., p. 16. See also: UNISDR 2009, loc. cit., p. viii.

114 UNISDR 2009, loc. cit., p. 12.

115 Cf. Z.G. BAI et al.: Global Assessment of Land Degradation and Improvement (GLADA). Identification by remote sensing (Report 2008/01, ISRIC - World Soil Information). Wageningen 2008, p. 23-29. See also: Millennium Ecosystem Assessment 2005, loc. cit., p. 7.

116 Cf. BAI et al., loc. cit., p. 23.

Due to the lack of a harmonized methodology and adequate monitoring and assessment tools, however, several questions regarding the trends over time as well as the causal patterns, spatial distribution, severity and extent of DLDD phenomena remain unanswered.¹¹⁷ Today, estimates on a global scale vary significantly, depending on the methodology used and the type of land degradation included.¹¹⁸ Moreover, the mapping of affected areas, meaning arid, semi-arid and dry sub-humid areas affected or threatened by DLDD, is currently equally insufficient on national and sub-national levels.¹¹⁹ In order to address these shortcomings, the UNCCD, in cooperation with the Dryland Science for Development (DSD) consortium, convened the *UNCCD 1st Scientific Conference* in September 2009.¹²⁰ As will be further discussed in chapter four, the purpose of the conference was to analyze and summarize leading scientific knowledge on biophysical and socio-economic monitoring and assessment of DLDD to support decision-making in land and water management and effectively combat desertification in affected countries, regions, and on a global scale.¹²¹ Moreover, the conference addressed current scientific uncertainties regarding the causal patterns and underlying driving forces of DLDD. Some of the key findings of the conference are presented in the subsequent section.

117 Cf. Millennium Ecosystem Assessment 2005, loc. cit., p. 7. See also: Ulf HELLDÉN: A coupled human-environment model for desertification simulation and impact studies, in: *Global and Planetary Change* 64 (2008), p. 158-168, p. 158-159; and: UNCCD 2009: UNCCD 1st Scientific Conference: Synthesis and recommendations (ICCD/COP(9)/CST/INF.3), p. 2. Available at <<http://unccd.int/cop/official-docs/cop9/pdf/cstinf3eng.pdf>>.

118 Cf. HELLDÉN, loc. cit., p. 158.

119 Cf. UNCCD 2009: Scientific Conference, loc. cit., p. 5.

120 “DSD is a consortium of five research organizations with deep and complementary experience on issues of sustainable land management and combating land degradation. The five organizations (in alphabetical order) are: European DesertNet, the International Center for Agricultural Research in Dry Areas (ICARDA), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the European Commission Joint Research Centre – Institute for Environment and Sustainability (JRC-IES), and United Nations University's International Network on Water, Environment and Health (UNU-INWEH)”. The website of the DSD consortium can be found here: <<http://dsd-consortium.jrc.ec.europa.eu/php/index.php?action=view&id=160>> (31.03.2011), n. p.

121 Cf. UNCCD 2009: Scientific Conference, loc. cit., p. 2-3.

3.1.2 Causal Patterns and Consequences of DLDD

Today, it is widely recognized that DLDD is best explained by regionally varying combinations of socio-economic and biophysical factors.¹²² The summary report of the UNCCD 1st Scientific Conference (CCD/COP(9)/CST/INF.2) clearly acknowledges that DLDD “results from dynamic, interconnected, human-environment interactions in land systems, where land includes water, soil, vegetation and humans”.¹²³ Against this background, the recently developed *Dryland Development Paradigm* (DDP) represents a useful convergence of the key findings drawn from research in desertification, vulnerability, poverty alleviation and ecosystem management.¹²⁴ Through the study of coupled human-environmental (H-E) systems that cause DLDD, the DDP particularly centers on the livelihoods of human populations in drylands and their dependencies on these unique ecosystems.¹²⁵ The DDP emphasizes (1) the need to adopt an integrated approach and recognize the links between the human and environmental components of dryland issues; (2) the need to identify slowly evolving conditions and focus on long-term solutions; (3) the importance of managing nonlinear processes, since dryland systems are often not in equilibrium and therefore might exhibit multiple ecological states; (4) the need to anticipate cross-scale interactions and interdependent feedback loops; and (5) the critical importance of local environmental knowledge to keep human management decisions in tune with the functioning of the system.¹²⁶

However, despite the knowledge gaps in understanding the causal patterns of DLDD, some general characteristics can be identified in regard to the biophysical and socio-economic impacts of DLDD on key ecosystem services such as food, fiber and water (see figure 2).¹²⁷ Drylands are mainly being degraded by climatic variations and unsustainable human activities such as over-

122 Cf. GEIST / LAMBIN, loc. cit., p. 828. See also: UNCCD 2009: Scientific Conference, loc. cit., p. 2-5.

123 UNCCD 2009: Scientific Conference, loc. cit., p. 2.

124 Cf. James F. REYNOLDS et al.: Global Desertification: Building a Science for Dryland Development, in: *Science* 316 (2007), p. 847-851, p. 847.

125 Cf. UNCCD 2009: Scientific Conference, loc. cit., p. 3.

126 Cf. VERSTRAETE et al., loc. cit., p. 106. See also: UNCCD 2009: Scientific Conference, loc. cit., p. 3. *A heterarchical system of organization is affected by overlap, multiplicity, mixed ascendancy, and/or divergent, yet coexistent patterns of relation.*

127 Cf. UNCCD 2009: Scientific Conference, loc. cit., p. 10. See also: GEIST, loc. cit., p. 7-10; and: REYNOLDS / STAFFORD SMITH, loc. cit., p. 14-15.

cultivation, overgrazing, deforestation and poor irrigation practices.¹²⁸ The mismanagement and overuse of lands may be brought about by indirect drivers such as distorted economic conditions and inappropriate legal and political frameworks on local to global scales.¹²⁹ As a direct driver, DLDD leads to the deterioration of the biophysical and socio-economic properties of soils and results in a persistent loss of biodiversity and ecosystem services.¹³⁰ Degraded land may cause downstream flooding, reduced water quality, sedimentation in rivers and lakes, and siltation (i.e. the deposition of water-borne silt in a body of water) of water reservoirs and navigation channels.¹³¹

Thus, unsustainable land and water management practices are likely to aggravate droughts, flooding and water stress.¹³² If the water table rises due to inadequate drainage and poor irrigation practices, the soil can also become waterlogged and salinization may occur.¹³³ Salinization (i.e. the process by which water-soluble salts accumulate in the soil) in turn can hinder the growth of crops by limiting their ability to take up water and reduce agricultural yields.¹³⁴ Moreover, exposed and eroded topsoil can be washed away or blown away by the wind.¹³⁵ Land degradation can thus trigger dust storms and air pollution, resulting in damaged machinery, unwanted sediment deposits, reduced visibility and mental stress.¹³⁶ Wind-blown dust can also worsen health problems, including eye infections, respiratory illnesses and allergies.¹³⁷ Hence DLDD may have strong adverse impacts on non-drylands as well. Due to biophysical impacts such as dust storms and downstream flooding, affected areas may sometimes be located thousands of kilometers away from the drylands.¹³⁸ In addition, most dryland populations directly rely on ecosystem productivity to ensure their livelihoods.¹³⁹ Therefore, the reduction of arable lands

128 Cf. UNCCD (n. d.): An introduction to the United Nations Convention to Combat Desertification (UNCCD Fact sheet 1), p. 1.

129 Cf. UNCCD (n. d.): The causes of Desertification (UNCCD Fact sheet 2), p. 1.

130 Cf. REYNOLDS / STAFFORD SMITH, loc. cit., p. 14-19.

131 Cf. UNCCD Fact sheet 2, loc. cit., p. 1.

132 Cf. UNCCD (n. d.): The consequences of Desertification (UNCCD Fact sheet 3), p. 1. See also: UNISDR 2009, loc. cit., p. 9-10.

133 Cf. UNCCD Fact sheet 3, loc. cit., p. 1.

134 Cf. WILLIAMS / BALLING, loc. cit., p. 50. See also: UNCCD Fact sheet 3, loc. cit., p. 1.

135 Cf. WILLIAMS / BALLING, loc. cit., p. 42-47.

136 Cf. UNCCD Fact sheet 3, loc. cit., p. 1.

137 Cf. *ibid.*

138 Cf. Millennium Ecosystem Assessment 2005, loc. cit., p. 2.

139 Cf. *ibid.*, p. 4.

and ecosystem services due to DLDD poses a major threat to human well-being. Despite the fact that dryland populations have, over generations, developed methods to cope with long lasting scarcity, the unnatural extension of these periods can overwhelm their resources and adaptation strategies.¹⁴⁰ At the same time, dryland areas are the original home of many important food crops such as wheat, barley, millet and sorghum – and botanical medicines, resins and oils.¹⁴¹ Accordingly, the societal impacts of DLDD include food insecurity and malnutrition, health problems, poverty, migration, political instability, and conflict. Today, countries with dryland populations, above all those in the Sahel zone, rank particularly low in the *Human Development Index* (HDI) list of the United Nations.¹⁴² In addition, up to 70% of the world's extremely poor people live in remote rural areas.¹⁴³ Since policies to support alternative livelihoods are seldom in place, migration to unaffected areas and/or locations of greater economic opportunity is the result.¹⁴⁴ These migratory movements, often from rural to urban areas, can exacerbate urban sprawl and give rise to ethnic and social conflict.¹⁴⁵

Although sufficient quantitative evidence is not available at present and forecasts are rather unreliable, it is very likely that global environmental change will drive millions of people to migrate in the course of this century.¹⁴⁶ Moreover, the world population is projected to grow from 6 billion to more than 9.2 billion people by 2050.¹⁴⁷ Most of this population increase will occur in developing countries and a significant portion will take place in the drylands.¹⁴⁸ Dryland populations have one of the highest population growth rates

140 Cf. Millennium Ecosystem Assessment 2005, loc. cit., p. 5.

141 Cf. American Association for the Advancement of Science (AAAS) 2000: AAAS Atlas of Population and Environment, p. 131. Available at <<http://atlas.aaas.org/pdf/131-34.pdf>>.

142 Cf. UNDP 2010: Human Development Report 2010 – 20th Anniversary Edition. The Real Wealth of Nations: Pathways to Human Development, p. 145-146. Available at <http://hdr.undp.org/en/media/HDR_2010_EN_Complete_reprint.pdf>.

143 Cf. World Bank 2010: World Development Report 2010: Development and Climate Change, p. 40. Available at <<http://www.worldbank.org/wdr>>.

144 Cf. *ibid.*, p. 6.

145 Cf. *ibid.*

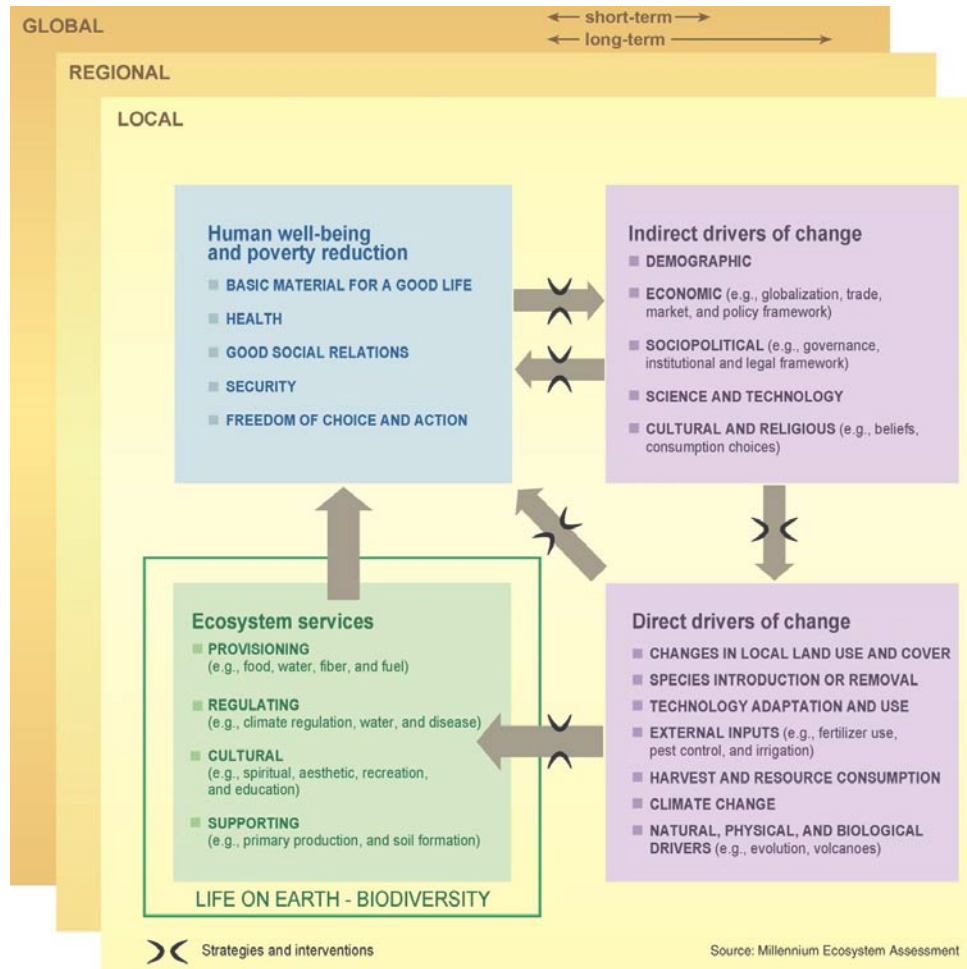
146 Cf. Anthony OLIVER-SMITH / Xiaomeng SHEN (eds.): Linking Environmental Change, Migration and Social Vulnerability (Studies of the University: Research, Counsel, Education Publication Series of UNU-EHS No. 12). United Nations University 2009, p. 9. Available at <<http://www.ehs.unu.edu/file/get/4019>>.

147 Cf. Rattan LAL: Enhancing Eco-efficiency in Agro-ecosystems through Soil Carbon Sequestration, in: Crop Science 50 (2010), p. 1-12, p. 1-2.

148 Cf. BRAUCH / OSWALD SPRING, loc. cit., p. 1.

in the world, with an average of 18.5% during the 1990s.¹⁴⁹ Today, estimates of population numbers in drylands vary from 1.5 to 2.1 billion people.¹⁵⁰

Figure 2: Conceptual Framework of Interactions between Biodiversity, Ecosystem Services, Human Well-being, and Drivers of Change



(Source: Millennium Ecosystem Assessment Synthesis 2005.)¹⁵¹

In addition, the specific characteristics of affected populations require further attention in order to connect current research with the needs of local communities and enhance poverty alleviation efforts as well as economic development. Sound knowledge of the demographic structure, health status, educa-

149 Cf. Millennium Ecosystem Assessment 2005, loc. cit., p. 8.

150 Cf. *ibid.*, p. 1. See also: JOHNSON / MAYRAND / PAQUIN, loc. cit., p. 1.

151 Millennium Ecosystem Assessment 2005: Ecosystems and Human Well-being: Synthesis, p. vii. Available at <<http://www.maweb.org/>>.

tion and population composition in terms of economically active groups are important for research planning and implementation as well as for the translation of generated technologies into useful goods and services.¹⁵² A sound knowledge of these factors is especially important for dryland areas where spatial and temporary changes in population can be observed either because of influx of refugees or inter-regional migration patterns typical among pastoral communities. However, while the total number and demographic structure of people directly and indirectly affected by unproductive drylands remains subject to debate, it is estimated that currently about 1.5 billion people depend on degrading land.¹⁵³ In addition, it is expected that by 2050 the total population in today's developing countries will grow by 2.5 billion people.¹⁵⁴ These demographic trends undoubtedly pose significant environmental and socio-economic challenges.

3.2 Institutional Structure and Procedures of the Convention

The United Nations Convention to Combat Desertification was negotiated in June 1992 under the auspices of the *United Nations Conference on Environment and Development* (UNCED), also known as the 'Rio Earth Summit'.¹⁵⁵ The UNCED recommended to the United Nations General Assembly the establishment of an "Intergovernmental Negotiating Committee for the Elaboration of an International Convention to Combat Desertification" (INCD).¹⁵⁶ As a result of five INCD preparatory sessions, the UNCCD was adopted on 17 June 1994 in Paris, France.¹⁵⁷ Ninety days after it had been ratified by 50 Parties, the

152 Cf. Alice A. KAUDIA / Emily OBONYO: Sociological Aspects of Land Use Decisions: A Focus on Demography, Livelihoods and Poverty. Kenya Forestry Research Institute 2003, p. 2-4. Available at <<http://www.etfrn.org/etfrn/workshop/degradedlands/documents/kaudia.doc>>.

153 Cf. United Nations Decade for Deserts and the Fight Against Desertification 2010, loc. cit., n. p. See also: Philip DOBIE: Poverty and the Drylands. UNDP 2001, p. 3. Available at <<http://arabstates.undp.org/contents/file/Poverty-and-the-Drylands-Challenge-Paper.pdf>>.

154 Cf. World Bank 2010, loc. cit., p. 40.

155 Cf. UNCCD (n. d.): Institutions and procedures of the Convention (UNCCD Fact sheet 9), p. 1.

156 STRINGER / BAUER, The Role of Science, loc. cit., p. 251.

157 Cf. UNCCD Fact sheet 9, loc. cit., p. 1.

Convention entered into force on 26 December 1996.¹⁵⁸ Related to the Rio Earth Summit, the UNCCD is one of the so-called *Rio conventions*, and thus a ‘sister convention’ to the conventions on climate change and biological diversity. As of March 2011, the UNCCD benefits from the membership of 194 Parties, including all 192 Member States of the United Nations as well as the European Community and the Cook Islands.¹⁵⁹ Countries which have ratified, accepted, approved or acceded to the Convention become Parties and are legally responsible for carrying out their treaty commitments ninety days after having deposited their instrument of ratification, acceptance, approval or accession.¹⁶⁰

Today, the UNCCD is the sole MEA on land and soil degradation.¹⁶¹ The supreme decision-making body of the UNCCD is the *Conference of the Parties* (COP), which periodically reviews the implementation of the Convention. Up to the year 2011, the COP has held ten sessions. The COP is comprised of

158 Cf. UNCCD Fact sheet 9, loc. cit., p. 1.

159 For further information on the Parties to the UNCCD, see: UNCCD (n. d.): <<http://www.unccd.int/convention/ratif/doeif.php>> (31.03.2011), n. p. *The Cook Islands are a self-governing parliamentary democracy in free association with New Zealand. Therefore they can be recognized as a Party to the UNCCD, but not as a sovereign state.*

160 Cf. UNCCD Fact sheet 9, loc. cit., p. 1. See also: United Nations 1999: United Nations ‘Treaty Collection. Treaty Reference Guide, p. 6-9. Available at <<http://untreaty.un.org/ola-internet/Assistance/guide.pdf>>. *In reference to Arts. 2 (1) (b), 14 (1), 15, and 16, of the Vienna Convention on the Law of Treaties (1969), ‘acceptance’, ‘approval’ or ‘ratification’, in legal terms, define the international act whereby a country indicates its consent to be bound to a treaty if the Parties intended to show their consent by such an act. The instruments of ‘acceptance’ or ‘approval’ of a treaty have the same legal effect as ratification and consequently express the consent of a country to be bound by a treaty. In the practice of certain countries acceptance and approval have been used instead of ratification when, at a national level, constitutional law does not require the treaty to be ratified by the head of state. In the case of multilateral treaties the usual procedure is for the depositary to collect the ratifications of all countries, keeping all Parties informed of the situation. The institution of ratification grants countries the necessary time-frame to seek the required approval for the treaty on the domestic level and to enact the necessary legislation to give domestic effect to that treaty. ‘Accession’ is the act whereby a country accepts the offer or the opportunity to become a Party to a treaty already negotiated and signed by other countries. It has the same legal effect as ratification. Accession usually occurs after the treaty has entered into force. The Secretary-General of the United Nations, in his function as depositary, has also accepted accessions to some conventions before their entry into force. The conditions under which accession may occur and the procedure involved depend on the provisions of the treaty. A treaty might provide for the accession of all other countries or for a limited and defined number of countries. In the absence of such a provision, accession can only occur where the negotiating countries agree or subsequently agree on it in the case of the country in question.*

161 Cf. STRINGER / BAUER, *The Role of Science*, loc. cit., p. 251. See also: JOHNSON / MAYRAND / PAQUIN, loc. cit., p. 4.

ratifying governments and interstate organizations such as the European Union and makes special provision for non-state bodies such as “national and international agencies and qualified NGOs” to attend COP meetings and contribute to its work.¹⁶² To facilitate the implementation of the Convention, Parties submit review reports to the COP, which then makes recommendations on the basis of these reports.¹⁶³ Furthermore, the COP has the legal authority to make amendments to the Convention, establish subsidiary bodies and adopt new annexes, such as additional regional implementation annexes.¹⁶⁴ At present, the Convention contains five ‘Regional Annexes’ on the implementation of the treaty in Africa, Asia, the Northern Mediterranean, Latin America and the Caribbean as well as Central and Eastern Europe.¹⁶⁵ These annexes include elements for the preparation of action programs and their exact focus and content according to the predominant climatic, geographical and socio-economic factors. On the ground, the Convention operates through different action programs such as *National Action Programs* (NAP), *Sub-regional Action Programs* (SRAP) and *Regional Action Programs* (RAP). These programs aim to enhance participatory and consultative processes and involve governments, relevant stakeholders, and local communities in taking steps to combat DLDD.¹⁶⁶ In addition, representatives from each country Party are appointed as national *Focal Points* for the Convention.¹⁶⁷ Affected country Parties can also establish a UNCCD National Coordinating Body to administer the formulation and implementation of particular NAPs and mobilize national as well as international resources.¹⁶⁸

Apart from the COP, the institutional structure of the Convention comprises the UNCCD *Secretariat* located in Bonn, Germany, as well as several subsidiary bodies. The Secretariat consists of the UNCCD Executive Secretary, currently Mr. Luc Gnacadja from Benin, and the UNCCD staff. The most important functional clusters of the Secretariat are: (1) Knowledge Management, Science and Technology (KMST); (2) Awareness Raising, Communication and Education (ARCE); (3) Policy Advocacy and Global Issues

162 UNCCD Fact sheet 9, loc. cit., p. 1.

163 Cf. *ibid.*

164 Cf. *ibid.*

165 United Nations 1994, loc. cit., p. 33-58.

166 Cf. UNCCD (n. d.): Action programmes for combating desertification (UNCCD Fact sheet 4), p. 1-2.

167 Cf. UNCCD (n. d.): List of UNCCD focal points, in: <<http://www.unccd.int/focalpoints/focalpoints.php>> (31.03.2011), n. p.

168 Cf. UNCCD (n. d.): Desertification. A Glossary, in: <<http://www.unccd.int/knowledge/glossary.php?noMenus=1>> (31.03.2011), n. p.

(PAGI); (4) Facilitation, Capacity Building, Monitoring of Implementation (FCMI); as well as (5) Conference Service (CoSe); and (6) Administration and Finance Service (AFS).¹⁶⁹ The Secretariat makes arrangements for sessions of the COP and its subsidiary bodies and provides them with services as required.¹⁷⁰ The key task of the Secretariat is to compile and transmit information and reports due under the Convention. In this regard, the Secretariat provides assistance to affected developing country Parties, particularly those in Africa. Furthermore, the Secretariat coordinates UNCCD activities with the secretariats of other relevant international bodies and conventions, such as the UNFCCC and CBD.

The subsidiary bodies established under the Convention include: (1) *The Committee on Science and Technology* (CST); (2) *The Committee for the Review of the Implementation of the Convention* (CRIC); and (3) *The Global Mechanism* (GM).¹⁷¹ The Committee on Science and Technology is a multidisciplinary body set up to support decision making and provide advice and information on the latest scientific knowledge and important technological matters related to combating DLDD.¹⁷² It elects its own bureau and is composed of government representatives competent in relevant fields of expertise.¹⁷³ The CST Bureau is directly responsible for the implementation of the CST work program.¹⁷⁴ The Committee for the Review of the Implementation of the Convention, established by COP5 in 2001, is a standing subsidiary body under the authority and guidance of the COP.¹⁷⁵ To improve the coherence, impact and effectiveness of UNCCD policies and programs, the CRIC assists the COP in the review of the implementation of the Convention and functions as an integral part of the 'performance review and assessment of implementation system' (PRAIS), established by the COP at its ninth session.¹⁷⁶

169 Cf. UNCCD 2010: Secretariat of the United Nations Convention to Combat Desertification. Organizational Chart. Available at: <http://unccd.int/secretariat/sns/docs/snstructure_final.pdf>.

170 Cf. United Nations 1994, loc. cit., p. 24.

171 Cf. UNCCD Fact sheet 9, loc. cit., p. 1-2.

172 Cf. UNCCD (n. d.): The role of science and technology (UNCCD Fact sheet 7), p. 1.

173 Cf. ibid. See also: UNCCD 2009: CST Highlights no. 1, loc. cit., p. 3.

174 Cf. UNCCD 2009: CST Highlights no. 1, loc. cit., p. 4.

175 Cf. UNCCD 2009: Report of the Conference of the Parties on its ninth session. Addendum. Part two: Action taken by the Conference of the Parties at its ninth session (ICCD/COP(9)/18/Add.1), p. 78.

176 Cf. UNCCD 2009, Report of the Conference of the Parties on its ninth session, loc. cit., p. 78.

The *Global Mechanism*, as a subsidiary body of the UNCCD, is in charge of promoting actions for the mobilization and channeling of substantial financial resources, including the transfer of technology – on a grant basis, or on other terms – to affected developing country Parties.¹⁷⁷ The GM also provides advisory services regarding the coordination among different sources of funding and greater efficiency in the use of funds.¹⁷⁸ The GM is hosted by the International Fund for Agricultural Development (IFAD) in Rome and also functions under the authority and guidance of the COP.¹⁷⁹ Furthermore, the largest independent public fund for the world's environmental challenges, the *Global Environment Facility* (GEF), has recently decided to amend its charter in order to affirm that it will be the primary financing mechanism of the UNCCD.¹⁸⁰ This step can be seen as especially important for the Convention, since at its establishment the UNCCD was neither explicitly nor formally linked to the GEF, nor accorded its own instrument to finance commitment activities of developing countries, therefore leaving affected country Parties to depend on official development assistance.¹⁸¹ The GEF, established in 1990 by the World Bank, UNDP and UNEP, currently unites 182 member governments to address global environmental issues in partnership with international institutions, NGOs, and the private sector.¹⁸² Today, the GEF provides grants to developing countries and countries with economies in transition for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants.

177 Cf. United Nations 1994, loc. cit., p. 20-22. See also: François FALLOUX / Susan TRESSLER / Karel MAYRAND: The Global Mechanism and UNCCD Financing: Constraints and Opportunities, in: Pierre Marc JOHNSON / Karel MAYRAND / Marc PAQUIN (eds.): *Governing Global Desertification. Linking Environmental Degradation, Poverty and Participation*. Aldershot 2006, p. 131-145, p. 132.

178 Cf. Global Mechanism (n. d.), loc. cit., n. p.

179 Cf. UNCCD Fact sheet 9, loc. cit., p. 2.

180 Cf. Global Environmental Facility 2010: GEF and UNCCD Take Bold New Financing Action to Fight Soil Erosion, in: <<http://www.thegef.org/gef/printpdf/3194>> (31.03.2011), p. 1. *Also see page 20 of this volume.*

181 Cf. *ibid.*, p. 2. *For a definition of official development assistance, see page 49 of this volume.*

182 Cf. Global Environmental Facility (n. d.): What is the GEF?, loc. cit., n. p.

3.3 Policies and Partnerships to Combat DLDD

The UNCCD is a unique instrument of governance in several ways. Its focus on the drylands has brought attention to some of the world's most vulnerable ecosystems and populations. Moreover, the integration of sustainable development and the environment, as promoted by the UNCCD, is increasingly perceived as a necessary and forward-looking approach to reshape the current development agenda and devise a concerted response to the convergence of the food, fuel, financial and economic crises, taking place against the backdrop of climate change. However, considering the fact that the need to combine efforts in fighting poverty, DLDD and climate change has only recently gained wider attention among policy makers, current debates revolving around sustainable development and global environmental change might well benefit from a 'renaissance' of the ideas that accompanied the establishment of the UNCCD and have been outlined in *Agenda 21*, a document initially developed to be exactly what its name implies: a comprehensive agenda for the 21st century. From the very beginning, the UNCCD was a result of chapter twelve of *Agenda 21*, calling for the establishment of an international convention to combat desertification.¹⁸³ In view of the necessity to provide a solid theoretical basis for policies that promote sustainable development, the chapters eight and nine of *Agenda 21* emphasize:

Prevailing systems for decision-making in many countries tend to separate economic, social and environmental factors at the policy, planning and management levels. [...] An adjustment or even a fundamental reshaping of decision-making, in the light of country-specific conditions, may be necessary if environment and development is to be put at the center of economic and political decision-making [...]

Land-use and resource policies will both affect and be affected by changes in the atmosphere. Certain practices related to terrestrial and marine resources and land use can decrease greenhouse gas sinks and increase atmospheric emissions. The loss of biological diversity may reduce the resilience of ecosystems to climatic variations and air pollution damage. Atmospheric changes can have important impacts on forests, biodiversity, and freshwater and marine ecosystems, as well as on economic activities, such as agriculture. Policy

183 Cf. Bo KJELLÉN: The Saga of the Convention to Combat Desertification: The Rio / Johannesburg Process and the Global Responsibility for the Drylands, in: RECIEL 12 (2003) 2, p. 127-132, p. 127.

*objectives in different sectors may often diverge and will need to be handled in an integrated manner.*¹⁸⁴

According to its critics, however, the concept of sustainable development that emerged from the 'Rio process' and manifested in the endorsement of the MDGs in 2002 has been largely suffering from its emphasis on "the interconnection of everything" and a lack of both specific priorities and a coherent strategy for its implementation.¹⁸⁵ Over the past few years, the focus of policy concern seems to have shifted away from the ambitious goals outlined in Agenda 21 towards a notion of sustainable development as 'the art of the economically possible'. With the secretariat of the Rio summit estimating that the implementation of Agenda 21 might cost approximately US \$600 billion a year and the global economy slowly recovering from an unprecedented crisis, the enthusiasm for sustainable development that followed the UNCED had to give way to a reassessment of the economic environment in which development processes take place.¹⁸⁶ Despite an overall increase in net capital inflows and accelerating gross domestic product (GDP) growth rates in many developing countries, recent World Bank analyses outline considerable challenges in achieving sustainable development worldwide, especially with a view to the MDGs, by stating that "average MDG progress is likely to be too slow to meet most social sector targets in most developing countries".¹⁸⁷ The United Nations Development Programme further concludes that the absolute number of the poor in South Asia and sub-Saharan Africa is increasing and sus-

184 United Nations Conference on Environment and Development 1992: Agenda 21. The United Nations Programme of Action from Rio, p. 71 and 81.

185 David G. VICTOR: Recovering Sustainable Development, in: Foreign Affairs 85 (2006) 1, p. 91-103, p. 91-96. *The 'Rio process' refers to the UNCED conference, held in Rio de Janeiro in 1992, and its follow-up process. In 1992, world leaders signed the UNFCCC, CBD and initiated the establishment of the UNCCD. The 'Rio Declaration' and the 'Statement of Principles for the Sustainable Management of Forests' were endorsed, and Agenda 21 was adopted. The 'Commission on Sustainable Development' (CSD) was created in December 2002 to ensure effective follow-up of the UNCED. In 2002, a ten-year review was held at the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa, resulting in the 'Johannesburg Declaration'. In view of the 20th anniversary of the UNCED in 2012, the United Nations General Assembly is currently organizing a three-day conference known as 'Rio + 20'.*

186 Cf. VICTOR, loc. cit., p. 92-94.

187 LAY: MDG Achievements, Determinants and Resource Needs, loc. cit., p. 26. See also: World Bank 2010: Global Economic Prospects: Crisis, Finance, and Growth, p. 45 and 53. Available at <<http://siteresources.worldbank.org/INTGEP2010/Resources/GEP2010-Full-Report.pdf>>. *The Gross Domestic Product measures a country's overall economic output. It describes the market value of all final goods and services produced in a specific country within a single year.*

tained poverty and hunger reduction is at risk.¹⁸⁸ This is mainly attributed to a surge in the prices of internationally traded food commodities and vulnerability to climate change impacts, particularly in the area of agricultural production.¹⁸⁹ MDG progress is also threatened by weak institutional capacity in conflict and post-conflict environments. The World Bank forecast for 2020 suggests that 826 million or 12.8% of the population in developing countries will be living on US \$1.25 a day (or less) and that there will be almost two billion poor people using the US \$2 a day poverty line, leaving particularly sub-Saharan Africa short of the poverty MDG.¹⁹⁰

Furthermore, the impacts of the recent financial and economic crisis pose significant challenges to sub-Saharan African countries and lead to severe long-term consequences for poverty reduction goals. Although most economies across sub-Saharan Africa appear to be responding to the global economic downturn better than expected, capital inflows have slowed down considerably in the aftermath of the 2008/2009 crisis.¹⁹¹ In addition, the region still experiences a considerable inequality in income distribution, faces serious infrastructure gaps, and retains a narrow export base, none of which is conducive to rapid and sustainable development.¹⁹² As a consequence of the global financial and economic crisis, it is further estimated that *net capital flows* to low and middle-income countries are unlikely to reach their pre-crisis levels in the medium term (US \$510 billion in 2010 relative to US \$1.1 trillion in 2007).¹⁹³ Net capital flows comprise the sum of (1) private capital flows, (2) official flows, (3) and changes in reserves. It is therefore necessary to take a closer look at each one of these components to better understand the financial factors behind the volatility of capital flows to sub-Saharan Africa.

188 Cf. UNDP 2010: What Will It Take to Achieve the Millennium Development Goals? An International Assessment, p. iv. Available at <http://undp.org.in/sites/default/files/reports_publication/MDG_report_0.pdf>.

189 Cf. *ibid.* See also: World Bank 2011: Global Economic Prospects Vol. 2: Navigating Strong Currents. Regional Annex Sub-Saharan Africa, p. 124.

190 Cf. World Bank 2010: Economic Prospects, loc. cit., p. 42.

191 Cf. Jomo Kwame SUNDARAM / Oliver SCHWANK / Rüdiger VON ARNIM: Globalization and development in sub-Saharan Africa (DESA Working Paper No. 102). DESA 2011, p. 2-4. Available at <http://www.un.org/esa/desa/papers/2011/wp102_2011.pdf>.

192 Cf. Ernest ARYEETEY et al.: The Economics of Africa (Charles H. Dyson School of Applied Economics and Management, Cornell University, Working Paper 2011-07). Ithaca, NY 2011, p. 8. Available at <<http://dyson.cornell.edu/research/researchpdf/wp/2011/Cornell-Dyson-wp1107.pdf>>.

193 Cf. World Bank 2011: Development Prospects Group (Weekly Global Economic Brief No. 76), p. 1.

Net capital inflows to sub-Saharan Africa fell from US \$53 billion in 2007 to US \$45 billion in 2009.¹⁹⁴ Likewise, private capital inflows fell by 35.3% (US \$-19.5 billion) with the onset of the crisis over 2007-2008.¹⁹⁵ Generally, private capital flows include (a) foreign direct investment flows (FDI), (b) portfolio investment, and (c) so-called 'other flows'. Regarding sub-Saharan Africa in particular, FDI still is the most important source of private capital flows today.¹⁹⁶ As the economic crisis has demonstrated, the volatile nature of these investments places private sector-led growth and sub-Saharan Africa's poverty reduction endeavors at a great risk.¹⁹⁷ In 2009, the region experienced a 12.3% decline in FDI inflows after half a decade of consecutive annual growth.¹⁹⁸ On a global scale, *FDI flows* have been severely affected by the economic crisis as well, and fell from US \$1.7 trillion to below US \$1.2 trillion in 2009.¹⁹⁹ Against this background, much of the sharp decrease in private capital flows to sub-Saharan Africa can be attributed to global trends in FDI flows, which contracted in almost all major economies during the years 2008 and 2009.²⁰⁰ Yet global FDI flows are likely to experience a slow recovery in 2011 (to a level up to US \$1.5 trillion) and gain momentum in 2012 (possibly approaching US \$2 trillion).²⁰¹ In spite of these positive signs, however, it has to be recognized that the boom in FDI flows during the first years of the new millennium bypassed over one-third of the countries in sub-Saharan Africa, and much of the region is still dependent on official external financing.²⁰² With a view to the

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- 194 Cf. World Bank 2010: Global Development Finance 2011: External Debt of Developing Countries, p. 2. Available at <<http://siteresources.worldbank.org/NEWS/Resources/gdf2010.pdf>>. See also: The World Bank 2010: Newly Released Data Reveal Drop in Capital Flows to Developing Countries in 2009, in: <<http://go.worldbank.org/NY94IRJQA0>> (31.03.2011), n. p.
- 195 Cf. UNU World Institute for Development Economics Research (UNU-WIDER) 2010: The Triple Crisis and the Global Aid Architecture (UNU-WIDER Working Paper 2010/01), p. 13. Available at <<http://www.wider.unu.edu/stc/repec/pdfs/wp2010/wp2010-01.pdf>>.
- 196 Cf. World Bank 2011: Global Economic Prospects Vol. 2, loc. cit., p. 116.
- 197 Cf. Ernest ARYEETEEY et al., loc. cit., p. 12.
- 198 Cf. World Bank 2011: Global Economic Prospects Vol. 2, loc. cit., p. 116.
- 199 Cf. UNCTAD 2010: World Investment Report 2010. Investing in A Low-Carbon Economy, p. xxi and xxxv. Available at <http://www.unctad.org/en/docs/wir2010_en.pdf>. See also: UNCTAD 2009: World Investment Report 2009. Transnational Corporations, Agricultural Production and Development, p. 18. Available at <http://unctad.org/en/docs/wir2009_en.pdf>.
- 200 Cf. UNCTAD 2010, loc. cit., p. 16.
- 201 Cf. *ibid.*, p. xiii.
- 202 Cf. International Monetary Fund 2010: Regional Economic Outlook Sub-Saharan Africa: Back to High Growth?, p. 42.

budget woes of traditional donors and due to the eagerness of governments to stimulate sustained economic growth and create domestic benefits such as knowledge spillovers and the reduction of unemployment rates, the competition to attract FDI flows among developing countries will continue to grow more intense in the coming years.²⁰³ Foreign investors, however, mainly invest in sub-Saharan countries because the return on investment is particularly high. As indicated by UNCTAD estimates, the rate of return of FDI in African countries is even considered to be the highest globally.²⁰⁴ It is nevertheless argued that FDI in Africa is unlikely “to bring sustained, broad-based economic growth, let alone strong employment generation”, since much of the investment in value terms still remains concentrated in the primary and extractive sectors of a relatively limited group of countries.²⁰⁵

On the whole, it will be a delicate balancing act for African governments to successfully manage trade liberalization, attract and yet regulate foreign direct investment and achieve diversification of export and production, since many African countries still remain reliant on primary commodity exports.²⁰⁶ Against this background, the harmonization of national laws within sub-Saharan Africa and the vigorous pursuit of their implementation remains a major source of concern for governments.²⁰⁷ Informal economies in conjunction with heavy bureaucracy and corruption often create considerable obstacles for entrepreneurs wishing to establish a company. They also hamper the prospects for intra-regional trade and domestic manufacturing. Consequently, the added value of processing is often lost to producers and does not benefit the local economies. Given these constraints, political stability, well-designed regulatory and institutional frameworks as well as strong anti-corruption measures and investments in infrastructure and education play a critical role in creating an environment favourable to sustained economic growth and employment gen-

203 Cf. World Bank 2010: *Economic Prospects*, loc. cit., p. 71. See also: International Monetary Fund 2010, loc. cit., p. 42.

204 Cf. World Bank 2011: *Global Economic Prospects Vol. 2*, loc. cit., p. 116.

205 SUNDARAM / SCHWANK / VON ARNIM, loc. cit., p. 10-11 and 29. See also: OECD / African Development Bank 2010: *African Economic Outlook 2010*, p. 9.

206 Cf. ARYEETEEY et al., loc. cit., p. 26. See also: Alexis ARIEFF / Martin A. WEISS / Vivian C. JONES: *The Global Economic Crisis: Impact on Sub-Saharan Africa and Global Policy Responses* (Congressional Research Service Reports). Washington D.C. 2010, p. 6.

207 Cf. United Nations Economic Commission for Africa 2010: *Assessing Regional Integration in Africa IV: Enhancing Inter-African Trade*, p. 379-380.

eration.²⁰⁸ Another critical aspect of African economies today is that the stock exchange markets are still at a developing stage. As a result, investors can make enormous profits that are impossible to make in more mature markets such as the European Union or the United States. These prospective profits in addition to financial speculation have prompted investors to increasingly invest in sub-Saharan Africa.²⁰⁹ During the financial crisis of 2008, however, local stock market indices collapsed and *portfolio investments* in sub-Saharan African countries turned sharply negative (US \$-16.7 billion).²¹⁰ Foreign investors, who had put capital primarily into banking, cement, telecommunications, and brewing companies, shied away from emerging markets due to the tightening of global credit conditions as well as the high exchange rate volatility and low liquidity of such capital markets.²¹¹ Consequently, investors withdrew large amounts of funding when the crisis hit. The risk of capital flight, however, also originates from another source, since domestic actors might prefer to invest their wealth in foreign currency.²¹² Against this background, the predominantly speculative nature of portfolio investment flows renders them unsuitable for financing long-term development.²¹³ Much of the recent positive comments about the resurgence in portfolio equity inflows to sub-Saharan Africa should therefore be taken with a pinch of salt, since increased portfolio investment in some of the region's financial markets is neither accounting for a substantial share of private capital flows nor likely to strengthen private domestic savings, foster employment creation, and deliver growth with poverty reduction.²¹⁴

208 Cf. Matthias BUSSE: On the Growth Performance of Sub-Saharan African Countries, in: Estey Centre Journal of International Law and Trade Policy 11 (2010) 2, p. 384-402, p. 393-398. Available at <http://www.esteycentre.ca/journal/j_pdfs/busse11-2.pdf>.

209 Cf. José Brambila MACIAS / Isabella MASSA: The global financial crisis and sub-Saharan Africa: The effects of slowing private capital inflows on growth (Overseas Development Institute Working Paper No. 304). London 2009, p. 2.

210 Cf. *ibid.*, p. 6. See also: ARIEFF / WEISS / JONES, *loc. cit.*, p. 12.

211 Cf. MACIAS / MASSA, *loc. cit.*, p. 13-14. See also: WikiLeaks 2011: Views on Sub-Saharan Africa from London-based Experts (Cable 09LONDON 1886), in: <<http://213.251.145.96/cable/2009/08/09LONDON1886.html>> (31.03.2011), n. p.

212 Cf. Andreas STEINER: The Accumulation of Foreign Exchange by Central Banks: Fear of Capital Mobility? (CDSE Discussion Paper No. 103). Mannheim 2010, p. 3-4.

213 Cf. SUNDARAM / SCHWANK / VON ARNIM, *loc. cit.*, p. 11.

214 Cf. MACIAS / MASSA, *loc. cit.*, p. 12-14. See also: ARIEFF / WEISS / JONES, *loc. cit.*, p. 12.

Furthermore, *other capital flows* to sub-Saharan Africa also appear to be negatively affected by the financial crisis, because of a drop in tourism revenues and remittances sent by African workers to their home countries. In spite of considerable difficulties to keep statistics on remittance flows due to the use of informal channels by migrant workers, the available figures show that remittance flows to sub-Saharan Africa fell from US \$21.4 billion in 2008 to US \$20.6 billion in 2009.²¹⁵ This overall decline is mainly attributed to the slow economic recovery and weak labor markets in the United States and Europe. Generally, however, it can be said that remittance flows to sub-Saharan Africa remain fairly stable and have been less affected by the crisis than anticipated.²¹⁶

To explain the volatility in net capital flows into sub-Saharan Africa, it is therefore necessary to not only focus on private capital flows, but also take into account the aforementioned variables of official flows and changes in reserves. *Changes in reserves* are due to the fact that central banks in sub-Saharan Africa have to buy and hold a great amount of international reserves to back their domestic currencies and liabilities, which leads to a reduction in net capital flows. However, as countries in sub-Saharan Africa continue to face risks arising from abrupt changes in terms of trade and aid flows, maintaining an adequate level of foreign reserves can be an important element in helping to reduce macroeconomic volatility, especially so if there are no alternative sources of financing. However, now as before, *official flows* remain the most important source of financing for most countries in the region (see figure 3).²¹⁷ Official flows are divided into Official Development Assistance (ODA) and Other Official Flows (OOF).²¹⁸ While OOF constitute only a relatively small net inflow, ODA is the distinctly primary capital flow to sub-Saharan Africa and is expected to provide a relatively constant financial source, given that

215 Cf. World Bank 2011: Migration and Remittances Factbook 2011. 2nd Edition, p. 34. See also: Justin Yifu LIN: Shocks, Crises, and Their Determinants (Economic Research Forum Working Paper No. 516). Economic Research Forum 2010, p. 6.

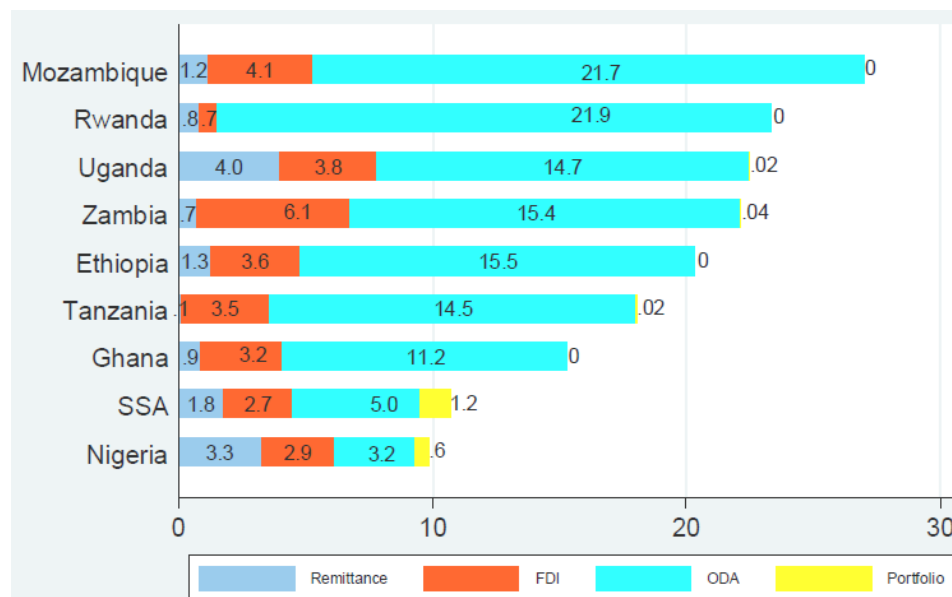
216 Cf. World Bank 2011: Migration and Remittances Factbook 2011, loc. cit., p. 34.

217 Cf. International Monetary Fund 2010, loc. cit., p. 52.

218 *ODA is defined by the Organization for Economic Co-Operation and Development (OECD) as "flows of official financing administered with the promotion of the economic development and welfare of developing countries as the main objective, and which are concessional in character with a grant element of at least 25% (using a fixed 10% rate of discount). By convention, ODA flows comprise contributions of donor government agencies, at all levels, to developing countries ('bilateral ODA') and to multilateral institutions. ODA receipts comprise disbursements by bilateral donors and multilateral institutions."* See: OECD (n. d.): Glossary of Statistical terms, in: <<http://stats.oecd.org/glossary/detail.asp?ID=6043>> (31.03.2011), n. p. *Total official flows are the sum of Official Development Assistance (ODA) and Other Official Flows (OOF) and represent the total disbursements by the official sector at large to the recipient country.*

FDI and portfolio investment flows tend to be more volatile.²¹⁹ With a view to the current economic situation, however, serious risks arise for ODA, since donor aid budgets are ultimately limited by economic size.²²⁰ Much of sub-Saharan Africa is particularly vulnerable to a downturn in official flows, given the region's longstanding ODA dependence.²²¹ At the same time, it has to be taken into account that ODA disbursement, net of debt relief, even fell prior to the onset of the financial and economic crisis and continues to fall well short of the targets and commitments made by the international donor community.²²²

Figure 3: Capital flows to Sub-Saharan Africa (SSA) and selected countries (% of GDP)



(Source: UNU-WIDER 2010, loc. cit., p.12. *Average of 2003-2007.*)²²³

219 Cf. Andrew MOLD et al.: Aid Flows in Times of Crises (Conference on Development Cooperation in Times of Crisis and on Achieving the MDGs). Madrid 2010, p. 13.

220 Cf. UNU-WIDER 2010, loc. cit., p. 8.

221 Cf. *ibid.*, p. 10. See also: United Nations 2011: World Economic Situation and Prospects, p. 74-75. Available at <http://www.un.org/en/development/desa/policy/wesp/wesp_current/2011wesp.pdf>.

222 Cf. UNU-WIDER 2010, loc. cit., p. 10. See also: United Nations 2011: World Economic Situation and Prospects, loc. cit., p. 118.

223 *Portfolio refers to portfolio investment equity flows in US\$. These flows are net and include "non debt-creating portfolio equity flows", meaning the sum of country funds, depository receipts and direct purchases of shares by foreign investors.*

In view of this low predictability of net capital flows, the growth potentials of developing countries, especially of dryland regions, will mainly depend on whether regulatory changes are made in the international financial architecture, or not.²²⁴ Furthermore, a number of countries have only recently emerged from civil wars and natural disasters, while armed conflicts have erupted in other parts of the region. Thus, additional resources need to be channeled to the private sector for achieving improvements in social conditions, decreasing vulnerability to external shocks and facilitating the region's integration into the world economy.²²⁵

Against this background, the UNCCD had to face frequent criticism for its alleged inability to secure, channel, and coordinate financial resources to fight poverty and DLDD in the drylands.²²⁶ These financial constraints have often been associated with the failure of the Global Mechanism to establish effective and operational networks, especially in regard to the private sector, and serve as an adequate tool for resource mobilization and financial expertise.²²⁷ Furthermore, the ambiguous mandate of the UNCCD, oscillating between the role of an environmental convention and sustainable development convention with particular emphasis on Africa, has been considered insufficient to effectively position DLDD issues within the global socio-political and economic agendas.²²⁸ The Joint Inspection Unit (JIU) of the United Nations found that a lack of consensus on the scope and role of the UNCCD generated continuous debates among Parties, and consumed time and resources.²²⁹ Moreover, institutional overlap between bodies of the Convention, such as the Secretariat and the Global Mechanism, led to 'cooperative fragmentation' and hampered the progress of implementation.²³⁰ In this regard the Secretariat has not been able to act as an effective broker between Parties and present to the COP a clear strategic vision to integrate sustainable development and the environ-

224 Cf. UNCTAD 2009, loc. cit., p. 80. See also: OECD 2005/2008: The Paris Declaration on Aid Effectiveness and the Accra Agenda for Action, p. 15-21. Available at <<http://www.oecd.org/dataoecd/30/63/43911948.pdf>>; and: United Nations 2011: World Economic Situation and Prospects, loc. cit., p. 85.

225 Cf. World Bank 2009: Innovative Financing for Development, p. 1.

226 Cf. FALLOUX / TRESSLER / MAYRAND, loc. cit., p. 131.

227 Cf. United Nations Joint Inspection Unit (JIU) 2009: Assessment of the Global Mechanism of the United Nations Convention to Combat Desertification (JIU/REP/2009/4), p. 10-13. Available at <<http://www.unjiu.org/en/reports.htm>>.

228 Cf. JIU 2009, loc. cit., p. 3-5.

229 Cf. *ibid.*, p. 3.

230 Cf. *ibid.*, p. 6-7.

ment.²³¹ However, the debate related to the ‘environmental versus developmental nature’ of desertification, albeit justified with regard to particular institutional flaws, seems to be largely outdated from a theoretical viewpoint. According to the UNCCD mandate, the main goal of the Convention, namely to combat desertification, “includes activities which are part of the integrated [sic] development of land in arid, semi-arid and dry sub-humid areas for sustainable development which are aimed at: (i) prevention and/or reduction of land degradation; (ii) rehabilitation of partly degraded land; and (iii) reclamation of desertified land”.²³² In view of the aforementioned goals defined in Agenda 21 and sound scientific evidence for the interdependent feedback loops between the political, socio-economic and biophysical aspects of biodiversity loss, climate change and DLDD, the distinction between the environment on the one hand and sustainable development on the other hand appears to be rather artificial.²³³

Yet it seems that the tide has turned recently. In view of the fact that the political landscape as well as the environmental and socio-economic challenges to which the UNCCD has to respond have changed considerably since the Convention came into force, the UNCCD COP8, held in Madrid in September 2007, unanimously adopted “*The 10-year strategic plan and framework to enhance the implementation of the Convention (2008-2018)*” (The Strategy).²³⁴ The Strategy sets out four strategic objectives to guide the actions of all UNCCD stakeholders until 2018, and five operational objectives to guide the short and medium-term work of the Convention. To make the UNCCD a systemic response to global environmental issues affecting land and its ecosystems, the main objectives of the Strategy aim to: (1) improve the livelihood of affected populations and the condition of affected ecosystems; (2) improve the productivity of affected populations and diversify their livelihood base; (3) reduce the vulnerability of affected populations and ecosystems to climate change, climate variability and drought; (4) generate global benefits; and (5) mobilize resources to support the implementation of the Convention through building

231 Cf. JIU 2009, loc. cit., p. 3-4.

232 United Nations 1994, loc. cit., p. 4.

233 Cf. IPCC 2007: Summary for Policy Makers, in: M.L. PARRY et al. (eds.): Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge 2007, p. 7-22, p. 9. See also: CBD (n. d.): Biodiversity for Development and Poverty Alleviation, p. 1. Available at <<http://www.cbd.int/doc/publications/bd-brochure-en.pdf>>.

234 Cf. UNCCD 2007: The 10-year strategic plan and framework to enhance the implementation of the Convention (2008-2018). Available at <[http://www.unccd.int/knowledge/docs/The%20Strategy%20 leaflet-english.pdf](http://www.unccd.int/knowledge/docs/The%20Strategy%20leaflet-english.pdf)>.

effective partnerships between national and international actors. The decision adopting the Strategy also called for managerial and systemic reforms toward results-based management (RBM) in the UNCCD process.²³⁵ These reforms include, among other matters, the development of widely accepted baselines and indicators to monitor DLDD under the auspices of the CST, and the development of new and standardized reporting guidelines for all Parties and stakeholders under the auspices of the CRIC.²³⁶

To overcome the multiple challenges related to DLDD, however, the policy changes that have been endorsed in The Strategy need to be translated into concrete action on the ground and mainstreamed into national development plans as well as decision-making processes at the macro, sectoral, and programmes/project level, including *Poverty Reduction Strategy Papers* (PRSPs).²³⁷ To achieve these goals, the UNCCD today mainly focuses on DLDD prevention, since attempts to rehabilitate desertified areas are costly and tend to deliver limited results.²³⁸ In areas where DLDD processes are at the early stages or relatively minor, it is more likely to halt these processes and restore affected ecosystem services.²³⁹ Addressing DLDD at an early stage also directly contributes to meeting the MDGs and preventing food insecurity, conflicts and poverty.²⁴⁰ Effective prevention of DLDD, however, requires both the creation of a ‘culture of prevention’ and a change in governments’ and peoples’ attitudes.²⁴¹ Land use practices that lead to desertification are often the proximate result of decisions by individual households and the community institu-

235 Cf. JIU 2009, loc. cit., p. 4. *The results-based management approach refers to the strategic and operational objectives and expected impacts outlined in the Strategy of the UNCCD.*

236 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH 2008: Desertification – Coping with Today’s Challenges in the Context of the Strategy of the UNCCD. High-Level Policy Dialogue, p. 17.

237 *The PRSP approach, initiated by the International Monetary Fund (IMF) and the World Bank in 1999, aims to provide a comprehensive country-based strategy for poverty reduction. The introduction of PRSPs was a recognition by the IMF and the World Bank of the importance of ownership as well as the need for a greater focus on poverty reduction. PRSPs aim to forge the crucial link between national public actions, donor support, and the development outcomes needed to meet the MDGs, which are centered on halving poverty between 1990 and 2015.* For further information, see: International Monetary Fund (n. d.): Poverty Reduction Strategy Papers (IMF Factsheet), p. 1. See also: JIU 2005, loc. cit., p. 2.

238 Cf. UNCCD 2007: The 10-year strategic plan, loc. cit., p. 1. See also: Millennium Ecosystem Assessment 2005, loc. cit., p. 2.

239 Cf. Millennium Ecosystem Assessment 2005, loc. cit., p. 14.

240 Cf. *ibid.*

241 Cf. *ibid.*

tions in which they are embedded.²⁴² In addition, national or local authorities may enable or constrain sustainable land management via decisions about economic regulation, resource allocation and land uses.²⁴³ As recognized by the UNCCD, policy frameworks must therefore be implemented at local to global scales with the active engagement of all Parties, relevant non-state bodies and – first and foremost – affected local communities.²⁴⁴ Following the proposals made in Section III of Agenda 21, the UNCCD promotes the so-called *bottom-up approach* aiming to enhance the involvement and full participation of affected populations and local communities in the implementation process of the Convention.²⁴⁵ Through its action programmes, the UNCCD furthermore seeks to support all measures that protect soils from erosion, salinization, and other forms of soil degradation, and generate benefits for affected populations.²⁴⁶ In this respect, integrated land and water management are key methods of DLDD prevention.²⁴⁷ Integrated management approaches can help addressing human activities such as overgrazing, overexploitation of plants, trampling of soils, and unsustainable irrigation practices that exacerbate dryland vulnerability.

Sustainable land management (SLM) strategies include measures such as rotational use of rangelands and stocking rates matched to the carrying capacity of ecosystems, which aim to reduce the pressures of human activities and protect soil from wind and water erosion.²⁴⁸ *Integrated water resource management* (IWRM) practices, on the other hand, enhance water-related services and provide reserves of water for use during drought periods.²⁴⁹ Water management practices may include the use of traditional water-harvesting techniques, water storage, and diverse soil and water conservation measures. In addition, a wide range of instruments and cooperative mechanisms such as microfinance, cooperative

242 Cf. S.P.J. BATTERBURY et al.: Responding to Desertification at the National Scale: Detection, Explanation, and Responses, in: James F. REYNOLDS / Mark STAFFORD SMITH (eds.): *Global Desertification. Do Humans Cause Deserts?* (Dahlem Workshop Report 88). Berlin 2002, p. 357-386, p. 357.

243 Cf. *ibid.*, p. 358 and 366.

244 Cf. Millennium Ecosystem Assessment 2005, loc. cit., p. 14. See also: Lindsey C. STRINGER et al.: Implementing the UNCCD: Participatory challenges, in: *Natural Resources Forum* 31 (2007), p. 198-211, p. 199.

245 UNCED 1992, loc. cit., p. 270. See also: UNCCD (n. d.): Participatory development: A bottom-up approach to combating desertification (UNCCD Fact sheet 6), p. 1.

246 Cf. UNCCD Fact sheet 9, loc. cit., p. 1-2.

247 Cf. Millennium Ecosystem Assessment 2005, loc. cit., p. 14.

248 Cf. *ibid.*

249 Cf. *ibid.*

land care, credit and marketing associations, multi-stakeholder organizations, land tenure reform, the rationalization of trade obstacles, and infrastructure improvements can, if carefully devised, be effective measures to strengthen the resilience of vulnerable populations and combat DLDD.²⁵⁰ Given the large variety of natural ecosystems, however, it is important to emphasize that universal policies to guide future land-use patterns will necessarily fail.²⁵¹ In order to achieve SLM, policy responses have to be region-specific and take into account major driving forces behind long-term changes occurring in different dryland areas. Based on this overview of UNCCD policy approaches and governance mechanisms, the following chapter will now explore opportunities to better integrate DLDD and climate change policies by assessing their common biophysical, social, political and economic dimensions. The case of bio-fuels will be used as a practical example.

250 Cf. UNCCD (n. d.): From Land Degradation to Land Health, p. 2. Available at <<http://unccd.int/knowledge/docs/Land%20Degradation%20to%20Land%20Health.pdf>>.

251 Cf. GEIST, loc. cit., p. 223.

4 Linking Land and Soil to Climate Change

4.1 How is Climate Change Related to Land, Ground and Soil?

4.1.1 Biophysical Correlations

There are numerous and serious impacts on land, ground and soil as a result of climatic changes.²⁵² The *Fourth Assessment Report* of the International Panel on Climate Change states that the resilience of many ecosystems is likely to be exceeded during the course of this century, if greenhouse gas (GHG) emissions continue at or above current rates.²⁵³ Given that ecosystems are significantly influenced by key climatic patterns such as mean temperature and precipitation, as well as their variability and extremes, any variation in these climatic patterns has a direct effect on the quality of land, soil, and availability of water.²⁵⁴ Climate change thus is an additional stressor on ecosystems that are already overburdened.

252 Cf. IPCC 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, p. 30. “*Climate change in IPCC usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the UNFCCC, where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.*”

253 Cf. IPCC 2007: Summary for Policy Makers, loc. cit., p. 11. See also: Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 15 and 59. *Greenhouse gases are gases in the atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the so-called ‘greenhouse effect’. The most important greenhouse gases in the Earth’s atmosphere are water vapor (H₂O), carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and ozone (O₃). The greenhouse effect is a process by which radiative energy leaving a planetary surface is absorbed by greenhouse gases and partly re-emitted towards the surface.* See: Peter HUPFER: Climate and its Variability, in: José L. LOZÁN / Hartmut GRABL / Peter HUPFER (eds.): Climate of the 21st Century. Changes and Risks. Hamburg 2001, p. 15-21, p. 17-19.

254 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 54.

The IPCC Working Group I acknowledges that “[l]ong-term trends from 1900 to 2005 have been observed in precipitation amount over many large regions [and] [d]rying has been observed in the Sahel, the Mediterranean, southern Africa and parts of southern Asia”.²⁵⁵ The Summary Report furthermore notes that: “More intense and longer droughts have been observed over wider areas since the 1970s, particularly in the tropics and subtropics”.²⁵⁶ According to the IPCC, this increase in droughts can be linked with higher temperatures, decreased precipitation, changes in sea surface temperatures, wind patterns, and decreased snow cover.²⁵⁷ These findings are supported by contemporary research. For a long time it was believed that desertification was largely a local or regional phenomenon.²⁵⁸ A recent study conducted by GIANNINI et al., dealing with the net effect of sea surface temperature changes on atmospheric circulation patterns, exemplified by the *El Niño*²⁵⁹ and other oscillations, nevertheless challenges this perception and calls for a reassessment of the ultimate causes of desertification. The study concludes that “the bulk of the variability in precipitation levels in the Sudano-Sahelian region may be directly related to observed changes in the water temperature in the Gulf of Guinea”.²⁶⁰ Taking into account similar observations, there is considerable evidence for the assumption that DLDD might be directly con-

255 IPCC 2007: Summary for Policy Makers, loc. cit., p. 7. See also: Commission on Climate Change and Development 2008: Climate Change and Drylands, p. 4-5. Available at <http://www.ccdcommission.org/Filer/pdf/pb_climate_change_drylands.pdf>.

256 IPCC 2007: Summary for Policy Makers, loc. cit., p. 8.

257 Cf. *ibid.*

258 Cf. VERSTRAETE et al., loc. cit., p. 106.

259 *El Niño-Southern Oscillation (ENSO) is a large-scale atmospheric pressure oscillation that occurs across the tropical Pacific Ocean on average every five years, but over a period which varies from two to seven years. ENSO events are far reaching and associated with floods, droughts and other climatic anomalies in all over the world, which vary with each event. Developing countries dependent upon agriculture and fishing are the most affected.* See: Wilfried ENDLICHER: Terrestrial Impacts of the Southern Oscillation and the Related El Niño and La Niña Events, in: José L. LOZÁN / Hartmut GRAßL / Peter HUPFER (eds.): Climate of the 21st Century. Changes and Risks. Hamburg 2001, p. 52-54, p. 52-54.

260 Cf. VERSTRAETE et al., loc. cit., p. 106. See also: Alessandra GIANNINI / Michaela BIASUTTI / Michel M. VERSTRAETE: A climate model-based review of drought in the Sahel: Desertification, the re-greening and climate change, in: Global and Planetary Change 64 (2008), p. 119-128, p. 126-127.

nected to globally-driven processes.²⁶¹ Under these circumstances, the catastrophic impacts of increased and prolonged drought phenomena that occur across major developing country dryland regions can be associated with climate change. However, quantifying the sole impact of climate change on coupled H-E systems is particularly difficult, since climate change can hardly be isolated from anthropogenic activities. The IPCC notes that “[m]ost of the global average warming over the past 50 years is *very likely* due to anthropogenic GHG increases and it is *likely* that there is a discernible human-induced warming averaged over each continent (except Antarctica)”²⁶²

Accordingly, *land use/land cover changes* resulting from DLDD contribute to anthropogenic climate change through a variety of processes.²⁶³ FOLEY et al. note that land use “has generally been considered a local environmental issue, but it is becoming a force of global importance”.²⁶⁴ Currently, up to one third of the world's terrestrial surface area is under agricultural management.²⁶⁵ Unsustainable land use practices, the increase of animal breeding, nitrogen fertilization, clear-cutting practices, intensive irrigation, reinforced salinization, as well as impacts from urban and industrial activities and biomass burning lead to a loss of soil productivity and reduction of vegetation cover.²⁶⁶ As a result of these degradation processes, the carbon sequestration capacity of the soil is

261 Cf. Roger A. PIELKE et al.: The influence of land-use change and landscape dynamics on the climate system: relevance to climate-change policy beyond the radiative effect of greenhouse gases, in: Phil Trans R Soc London Ser A. (2002) 360, p. 1705-1719, p. 1707-1708. See also: William R. COTTON / Roger A. PIELKE: Human impacts on weather and climate. Cambridge 2007, p. 228; and: Ning ZENG et al.: Causes and impacts of the 2005 Amazon drought, in: Environmental Research Letters 3 (2008) 014002 (9pp), p. 7-8.

262 IPCC 2007: Synthesis Report, loc. cit., p. 72.

263 Cf. Gregg MARLAND et al.: The climatic impacts of land surface change and carbon management, and the implications for climate-change mitigation policy, in: Climate Policy 3 (2003), p. 149-157, p. 151-152. Available at <<http://www.rrraul.org/ClimatePolicy-2003.pdf>>.

264 Jonathan A. FOLEY et al.: Global Consequences of Land Use, in: Science 309 (2005), p. 570-574, p. 570.

265 Cf. Reinhard F. HÜTTL / Oliver BENS / Bernd Uwe SCHNEIDER: The Role of Land Use for Climate Change, in: José L. LOZÁN / Hartmut GRABL / Peter HUPFER (eds.): Climate of the 21st Century. Changes and Risks. Hamburg 2001, p. 146-151, p. 146. *Glacial zones are excluded from this quantification.*

266 Cf. ibid., p. 150. *Land use, meaning “the observed physical and biological cover of the Earth’s land as vegetation or man-made features”, is defined through its purpose and is characterized by management practices such as logging, ranching and cropping.* See: IPCC 2000: Land Use, Land Use Change, and Forestry. Summary for Policymakers, p. 26. Available at <<http://www.ipcc.ch/pdf/special-reports/spm/srl-en.pdf>>.

reduced and organic carbon dioxide (CO₂) is released into the atmosphere.²⁶⁷ Land use/land cover changes and subsequent vegetation loss resulting from DLDD contribute to anthropogenic climate change by producing carbon emissions of approximately 230-290 million tonnes per year.²⁶⁸ Moreover, an estimated 13 million hectares of forests continue to be lost every year with severe consequences in terms of carbon emissions, biodiversity loss and environmental degradation.²⁶⁹ *Land use, land use change and forestry* (LULUCF) are responsible for close to 17.4% of all anthropogenic GHG emissions, making this sector the third-largest source of greenhouse gas emissions worldwide.²⁷⁰ Moreover, changes in the global atmospheric concentration of CO₂ and in land-surface characteristics affect the regional and global climate by altering the surface energy budgets.²⁷¹ To the extent that human agricultural and pastoral activities increase the stress on vegetation cover, they might be a factor in the increase of surface albedo.²⁷² Albedo is the ratio between backscattered and incoming irradiance and highly depends on the Earth's surface structure.²⁷³ Extended deforestation and land degradation let the albedo increase and reduce the absorption of solar energy at the Earth's surface, thus contributing to the persistence of droughts.²⁷⁴ Humans also transform the hydrologic cycle to provide freshwater for irrigation, industrial activities and domestic

267 Cf. HÜTTL / BENS / SCHNEIDER, loc. cit., p. 146. See also: Rattan LAL: Potential of Desertification Control to Sequester Carbon and Mitigate the Greenhouse Effect, in: *Climatic Change* 51 (2001) 1, p. 35-72, p. 36. Available at <<http://www.southwestnrm.org.au/sites/default/files/uploads/ihub/lal-r-2001potential-desertification-control-sequester.pdf>>.

268 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 13.

269 Cf. UNEP / FAO / United Nations Forum on Forests Secretariat (UNFF) 2009: *Vital Forest Graphics*, p. 4. Available at <http://grida.no/_res/site/file/publications/vital_forest_graphics.pdf>.

270 Cf. *ibid.*, p. 37. See also: H.-H. ROGNER et al.: Introduction, in: *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge 2007, p. 95-116, p. 105. *The percentage indicated for the LULUCF/forestry sector corresponds to its share in global GHG emissions in 2004.*

271 Cf. M.V.K. SIVAKUMAR: Interactions between climate and desertification, in: *Agricultural and Forest Meteorology* 146 (2007) 142, p. 143-155, p. 146.

272 Cf. *ibid.*

273 Cf. HÜTTL / BENS / SCHNEIDER, loc. cit., p. 150.

274 Cf. *ibid.*

consumption.²⁷⁵ In addition, anthropogenic nutrient inputs to the biosphere from atmospheric pollutants and fertilizers have widespread effects on water quality and coastal as well as freshwater ecosystems.²⁷⁶ Unsustainable land use also causes declines in biodiversity through the loss, modification and fragmentation of habitats, and the overexploitation of native species.²⁷⁷ However, if soil biodiversity continues to decrease due to intensified climate change, DLDD, and other human activities, whole edifices could collapse. Soil microbes and animals living in soils provide a wide array of ecosystem services, including nutrient cycling, carbon sequestration, decomposition, soil moisture retention and many more, and thus play important roles in climate regulation.²⁷⁸ Furthermore, the FAO estimated in 2005 that of the slightly more than 100 crop species that provide 90% of the food for 146 countries, 71 are bee pollinated (mostly by wild bees).²⁷⁹ As the natural habitats of these species are being lost or degraded due to human and climatic pressures, food security and human well-being are severely endangered.

In summary, significant changes in the global climate are expected over the course of the 21st century, which will negatively affect ecosystems and access to natural resources, such as water and arable land. According to the *Fourth Assessment Report* of the IPCC, dryland regions are particularly vulnerable to climate change.²⁸⁰ Yet, the extent of climate change and spatial patterns of impacts are still uncertain and projections vary between different scenarios. Due to the complexities of precipitation changes, vegetation-climate feedbacks and direct effects of CO₂ on vegetation, climate change modeling for dryland

275 Cf. S.L. POSTEL / G.C. DAILY / P.R. EHRLICH: Human Appropriation of Renewable Fresh Water, in: *Science* 271 (1996), p. 785-788, p. 785. See also: C.J. VÖRÖSMARTY et al.: Global Water Resources: Vulnerability from Climate Change and Population Growth, in: *Science* 289 (2000), p. 284-288, p. 287.

276 Cf. David FOSTER et al.: The Importance of Land-Use Legacies to Ecology and Conservation, in: *BioScience* 53 (2003) 1, p. 77-88, p. 83. See also: P.A. MATSON et al.: Agricultural Intensification and Ecosystem Properties, in: *Science* 277 (1997), p. 504-509, p. 508.

277 Cf. FOLEY et al., loc. cit., p. 570.

278 Cf. UNCCD 2010: Message from Luc Gnacadja, Executive Secretary. World Day to Combat Desertification, June 17, 2010, p. 1. Available at <<http://www.unccd.int/publicinfo/june17/2010/docs/es-eng.pdf>>.

279 Cf. FAO 2005: Protecting the Pollinators, in: <<http://www.fao.org/ag/magazine/0512sp1.htm>> (31.03.2011), n. p. See also: UNCCD 2010: Message from Luc Gnacadja, loc. cit., p. 1.

280 Cf. IPCC 2007: Synthesis Report, loc. cit., p. 50. See also: M. BOKO et al., loc. cit., p. 435; and: Commission on Climate Change and Development 2008, loc. cit., p. 9.

regions remains challenging.²⁸¹ Still, larger uncertainties exist in the prediction of arid ecosystem responses to GHG emissions and global warming.²⁸² The prediction of rainfall and temperature changes by using models that produce estimates of changes to yearly or seasonal averages, for instance, is not an appropriate method to assess effects in marginal rainfall and high temperature areas.²⁸³ Moreover, it is difficult to adequately simulate all potential impacts of human-induced land cover transformation, for example through agricultural systems and ecosystem disturbances (e.g. fires).²⁸⁴

Nonetheless, even 1.8°C warming of global mean surface air temperature – the minimum the world is likely to experience by the end of the century under highly optimistic scenarios (B1) – would result in altered weather patterns with global impacts.²⁸⁵ Increased weather variability, more frequent and extreme weather events, and greater exposure to coastal storm surges could lead to catastrophic and irreversible consequences.²⁸⁶ In addition, predictions of future warming for Africa and all sub-continental regions containing large dryland areas in Central and South America and Asia are relatively robust.²⁸⁷ For all of these regions, except for the most southern part of South America, greater warming than the global mean is projected by the IPCC.²⁸⁸ Against this background, it becomes clear that climate change effects will have strong interactions with non-climate stressors that affect populations and ecosystem services in the drylands. The following section of this book therefore aims to identify the social, political and economic impacts of climate change and correlate the results with the impacts of DLLD that have been detailed in the previous chapter.

281 Cf. Commission on Climate Change and Development 2008, loc. cit., p. 5.

282 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 13.

283 Cf. Commission on Climate Change and Development 2008, loc. cit., p. 5.

284 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 29.

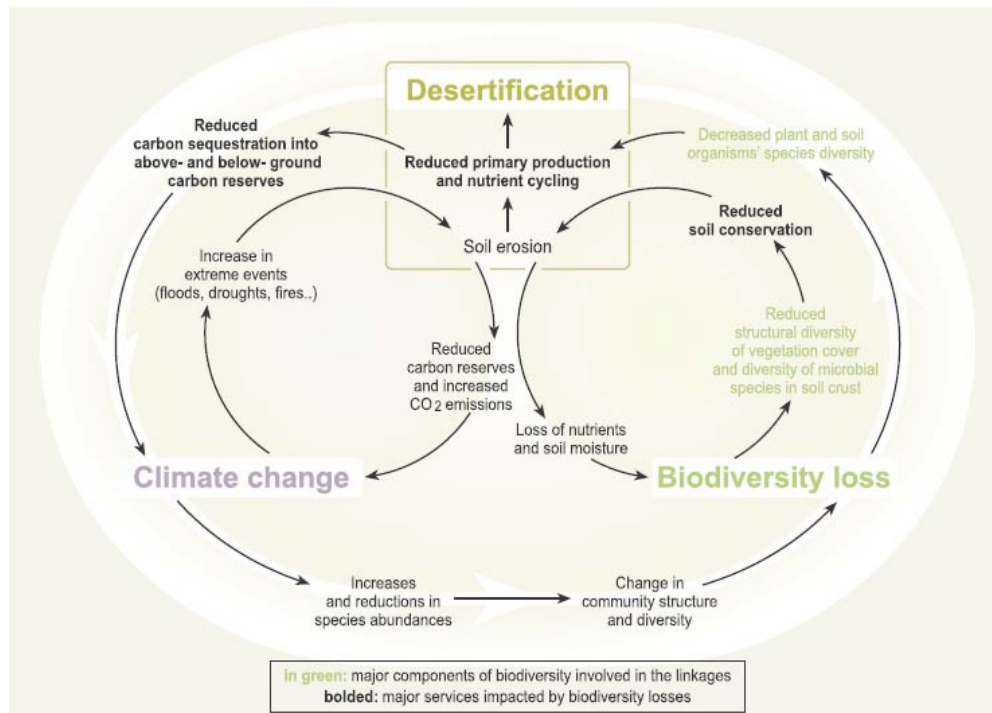
285 Cf. Jens HESSELBJERG CHRISTENSEN et al.: Regional Climate Projections, in: IPCC 2007: Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge 2007, p. 847-940, p. 850-851. See also: Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 40; and: IPCC 2007: Synthesis Report, loc. cit., p. 45.

286 Cf. HESSELBJERG CHRISTENSEN et al., loc. cit., p. 850-851. See also: World Bank 2010: World Development Report, loc. cit., p. xx.

287 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 33.

288 Cf. HESSELBJERG CHRISTENSEN et al., loc. cit., p. 850-851. See also: Deutsche Gesellschaft für Technische Zusammenarbeit 2009, loc. cit., p. 33-51.

Figure 4: Biophysical Linkages and Feedback Loops among Desertification, Global Climate Change, and Biodiversity Loss



(Source: Millennium Ecosystem Assessment 2005, loc. cit., p. 17.)²⁸⁹

4.1.2 Social, Political and Economic Correlations

Climate change, DLDD and biodiversity loss are negatively affecting natural and managed ecosystems upon which societies depend for their livelihoods. If current trends continue, agricultural yields in many regions will further decline, making it harder to meet the world's growing food demand.²⁹⁰ Crop yields in sub-Saharan Africa and South Asia have either stagnated or declined since the 1990s because of unsustainable farming practices and problems of environmental degradation.²⁹¹ There is also considerable evidence that even marginal warming causes crop damage and has negative impacts on agricultural production in Africa and Latin America.²⁹² In addition, the current

289 *Biodiversity loss directly affects dryland ecosystem services. Desertification contributes to biodiversity loss and climate change through land degradation, reduced soil productivity and carbon emissions. Global warming adversely affects biodiversity and DLDD.* See: Millennium Ecosystem Assessment 2005, loc. cit., p. 17.

290 Cf. World Bank 2010: World Development Report, loc. cit., p. 133.

291 Cf. LAL: Enhancing Eco-efficiency in Agro-ecosystems, loc. cit., p. 1.

292 Cf. MENDELSON, loc. cit., p. 16.

world population of 6.8 billion is projected to increase to 8.1 billion by 2030 and to 9.2 billion by 2050.²⁹³ Larger population numbers will put additional pressure on ecosystems, intensify the competition for arable land, water, and other natural resources, and increase the total demand for energy. Almost all of the future population increase will occur in developing countries, where soil and water resources are already under considerable stress and food security is severely endangered.²⁹⁴ The FAO estimates that 925 million people were undernourished in 2010 and expects the number to grow as international food prices (both in nominal and real terms) surge to a new historic peak in 2011.²⁹⁵ As of today, an estimated 578 million food-insecure people are living in the Asia and Pacific region, 239 million in sub-Saharan Africa, 53 million in Latin America and the Caribbean, 37 million in Middle East and North Africa, and 19 million in developed countries.²⁹⁶ Against this background, countries will have to reverse the trend of stagnating yields in the long term if the world is to meet its food needs in the face of climate change and extreme weather events. To meet the demand of a world population of 9.2 billion people, it is projected by the FAO that a 70% increase in global food production would be required by 2050.²⁹⁷ This must be done in a harsher climate with more storms, droughts, floods and changing precipitation patterns in some regions. Moreover, the world will have to cope with the changing dietary demands of richer populations in burgeoning economies that consume more meat and other resource-intensive products.²⁹⁸ In view of these major challenges, some scientists stress the need to radically rethink the use of agricultural biotechnology in order to meet the world's growing food demand and adapt existing food crops to changing temperatures, decreased water availability and other environmental constraints.²⁹⁹ This approach, however, is still subject to fierce political and scholarly debate.

293 Cf. LAL: Enhancing Eco-efficiency in Agro-ecosystems, loc. cit., p. 1-2.

294 Cf. World Bank 2010: World Development Report, loc. cit., p. 40.

295 Cf. OECD / FAO 2010: World Agricultural Outlook 2010-2019. Highlights, p. 16-17. Available at <<http://www.agri-outlook.org/dataoecd/13/13/45438527.pdf>>. See also: FAO 2010: The State of Food Insecurity in the World. Addressing food insecurity in protracted crises, p. 10. Available at <<http://www.fao.org/docrep/013/i1683e/i1683e.pdf>>; and: FAO 2011: Annual Real Food Price Indices (1990-2011). Available at <http://www.fao.org/fileadmin/templates/worldfood/Reports_and_docs/Food_price_indices_data_deflated.xls>.

296 Cf. FAO 2010: The State of Food Insecurity in the World, loc. cit., p. 10.

297 Cf. OECD / FAO 2010, loc. cit., p. 44.

298 Cf. World Bank 2010: World Development Report, loc. cit., p. 16.

299 Cf. N.V. FEDOROFF et al.: Radically Rethinking Agriculture for the 21st Century, in: Science 327 (2010), p. 833-834, p. 833.

Nonetheless, the projections of the World Agricultural Outlook 2010-2019 indicate growth rates in some agricultural sub-sectors which are on track with estimated longer term food requirements.³⁰⁰ The Outlook notes that especially livestock “is one of the fastest growing sub-sectors in agriculture with over 80% of the projected growth in the next decade taking place in developing countries, particularly in Asia and the Pacific (especially China) and Latin America, outpacing growth in the OECD area by a factor of 2:1”.³⁰¹ Yet the question remains, whether there can be sufficient confidence that the long-term impacts of such growth rates will not adversely affect the environment. The FAO estimates that today “the total area occupied by grazing is equivalent to 26% of the ice-free terrestrial surface of the planet”, while feed crop production requires about a third of all arable land.³⁰² The expansion of grazing land for livestock, however, is a major driving force for deforestation. About 70% of all grazing land in dry areas is considered degraded mostly because of overgrazing, compaction and erosion attributable to livestock activity.³⁰³ In addition, there is evidence that livestock activities cause considerable GHG emissions as well as water pollution and depletion.³⁰⁴ The IPCC acknowledges that “changes in range-fed livestock numbers in any African region will be directly proportional to changes in annual precipitation”.³⁰⁵ In spite of this, the livestock sector is culturally and economically significant for the poorest of the poor and provides food and income for one billion people, especially in dry regions, where livestock are often the only source of livelihoods.³⁰⁶ Therefore, this particular sector is an excellent example of how the interdependent feedback loops between the global economy, climate change, DLDD and rural livelihoods in dryland areas create dynamics, which require integrated policy solutions.

In any case, poverty remains a key problem in dryland areas that needs to be put at the forefront of international policy action. Dryland regions rank particularly low in the HDI list of the United Nations and experienced high

300 Cf. OECD / FAO 2010, loc. cit., p. 44.

301 Ibid.

302 Henning STEINFELD et al.: *Livestock's Long Shadow. Environmental Issues and Options*. FAO 2006, p. xxi.

303 Cf. *ibid.*, p. xxi.

304 Cf. *ibid.*, p. 84-111.

305 Paul DESANKER et al.: *Africa*, in: James J. MCCARTHY et al. (eds.): *Climate Change 2001: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge 2001, p. 487-532, p. 506.

306 Cf. STEINFELD et al., loc. cit., p. xx-xxi.

population growth rates in the 1990s that have placed additional pressure on all sectors of society.³⁰⁷ Now as before, the drylands are hosting a large share of the world's poor.³⁰⁸ Dryland populations are mainly dependent on a combination of rain-fed agriculture, livestock rearing and other activities that are extremely vulnerable to DLDD and the climate change impacts anticipated under most models.³⁰⁹ As natural resources become scarcer through desertification, food insecurity and poverty are exacerbated. This in turn leads to more people using less arable land, which potentially encourages the unsustainable use of ecosystem services and can facilitate desertification.³¹⁰ On the other hand, resource scarcity and environmental degradation will further intensify under climate change scenarios. Thus, the access to food for dryland populations will become increasingly unpredictable over time.

Extreme weather events and natural hazards also increase the probability of disease outbreaks and lead to new disease burdens in high HIV/AIDS regions.³¹¹ Basically, the spread of climate sensitive diseases alters with precipitation and temperature changes.³¹² Climate change is therefore likely to contribute to the range expansion of plant diseases, wildlife diseases and marine diseases.³¹³ Moreover, climate change and drought may adversely affect the health of rural populations through increased water scarcity and associated risks such as water contaminated with fecal and other hazardous substances (including parasites) and diseases associated with water-storage systems such as dengue fever and malaria.³¹⁴ As a consequence of DLDD and changing climate conditions, it is furthermore estimated that millions of people might lose their live-

307 Cf. Millennium Ecosystem Assessment 2005, loc. cit., p. 8.

308 Cf. *ibid.*, p. 7.

309 Cf. Commission on Climate Change and Development 2008, loc. cit., p. 4.

310 Cf. Sally-Anne WAY: Examining the Links between Poverty and Land Degradation: From Blaming the Poor toward Recognizing the Rights of the Poor, in: Pierre Marc JOHNSON / Karel MAYRAND / Marc PAQUIN (eds.): *Governing Global Desertification. Linking Environmental Degradation, Poverty and Participation*. Aldershot 2006, p. 27-41, p. 31.

311 Cf. Commission on Climate Change and Development 2008, loc. cit., p. 4.

312 Cf. C. Drew HARVELL et al.: Climate Warming and Disease Risks for Terrestrial and Marine Biota, in: *Science* 296 (2002), p. 2158-2162, p. 2162.

313 Cf. *ibid.* See also: Jonathan A. PATZ et al.: Impact of regional climate change on human health, in: *Nature* 438 (2005), p. 310-317, p. 315-316.

314 Cf. CONFALONIERI, loc. cit., p. 413.

lihoods and be forced to migrate in the near future.³¹⁵ Yet, estimates regarding the number of affected people are highly speculative and depend on a wide array of different factors and scenarios. It is not possible, for instance, to forecast the strategies that will be developed by affected populations to adapt to climate change.³¹⁶ Certain figures, e.g. ‘200 million people’ who are allegedly at risk of being driven from their homes by climate change, also bear a political meaning and “are produced with the aim of convincing governments to act to fight climate change [...] [w]ithout going as far as saying that they are artificially inflated”.³¹⁷ However, while the environment might play a crucial role in forced or voluntary migration, migration is usually also linked to economic, political and family decisions.³¹⁸ Therefore, a clear separation between these drivers and motivations remains difficult – if not impossible – and solid conclusions as to how much single drivers influence migration decisions have not been reached yet. Moreover, the distinction between environmental ‘migrants’ and ‘refugees’ remains a critical political issue for many governments.³¹⁹ Only people accorded official refugee status receive admission and access to resources and services provided by states to people who seek refuge because of a “persecution linked to his/her race, religion, political opinion, sexual orientation or belonging to a particular group”.³²⁰ These resources and services are unavailable to all other categories of migrants. Hence *environmental refugees*, meaning people that are forced to leave their homes due to environmental stress, still have no official recognition as refugees under the provisions of the

315 Cf. Diego MARTINO et al.: Environment for Development, in: UNEP 2007: Global Environmental Outlook 4. Environment for Development, p. 3-36, p. 21. Available at <http://www.unep.org/geo/geo4/report/GEO-4_Report_Full_en.pdf>. See also: William A.V. CLARK: Environmentally Induced Migration and Conflict (Externe Expertise für das Hauptgutachten des Wissenschaftlichen Beirats der Bundesregierung für Globale Umweltveränderungen “Welt im Wandel: Sicherheitsrisiko Klimawandel”). Berlin 2008, p. 1. Available at <http://www.wbgu.de/wbgu_jg2007_ex04.pdf>.

316 Cf. François GEMENNE / Douglas Pattie / Rajeb BOULHAROUF: Understanding Migration Choices: The UNCCD as a Mechanism for Developing Coping Strategies. UNCCD 2006, p. 7. Available at <<http://www.scribd.com/doc/38803912/4-s1>>.

317 Ibid.

318 Cf. *ibid.*

319 Cf. *ibid.*, p. 12.

320 Ibid.

United Nations Convention Relating to the Status of Refugees.³²¹ However, the problem of environmentally induced migration exists and will continue to grow. It is estimated that “environmentally induced migration either alone or in concert with social and political conflict is responsible for between 10 and 25 percent of migratory movements”.³²² Currently, approximately 214 million international migrants live outside their country of origin, while the number of IDPs amounts to 27.1 million.³²³ In addition, around 1.2 billion people, or almost one-fifth of the world’s population, live in areas of physical scarcity.³²⁴ In these areas, environmental change has immediate effects on the health and well-being of people who depend on scarce natural resources for their livelihoods. For people living in less industrialized regions and rural dryland areas, climate change and DLDD act as additional ‘push’ factors and represent a force of social change that causes migratory movements to urban areas and contributes to social tensions and slum formation.³²⁵ According to the IPCC, high annual growth rates in migration have been observed in developing countries of South and Southeast Asia.³²⁶ To take only a few examples, population growth, land scarcity and crop damage due to flooding contributed to the gradual migration of more than 10 million Bangladesh citizens to neighboring Indian states and from rural areas to urban centers during the past two

321 Cf. GEMENNE / PATTIE / BOULHAROUF, loc. cit., p. 8. See also: UNCCD (n. d.): Migration and Desertification (UNCCD Fact sheet 3), p. 1. *Since it was signed in Geneva in 1951, the ‘United Nations Convention Relating to the Status of Refugees’ is sometimes referred to as the ‘Geneva Convention’. However, the Geneva Conventions consist of four treaties and three additional protocols that set out the standards in international law for humanitarian treatment of the victims of war. They do not provide a definition of refugees or set out the rights of individuals who are granted asylum and the responsibilities of nations that grant asylum.*

322 CLARK, loc. cit., p. 1.

323 Cf. United Nations High Commissioner for Refugees (UNHCR) 2010: Global Trends 2009. Refugees, Asylum-seekers, Returnees, Internally Displaced and Stateless Persons, p. 1. Available at <<http://www.unhcr.org/4c11f0be9.html>>. See also: International Labour Organization (ILO) 2010: International Labour Migration. A Rights-based Approach, p. 1. Available at <http://www.ilo.org/public/english/protection/migrant/download/rights_based_approach.pdf>.

324 Cf. UN-Water / FAO 2007: Coping with Water Scarcity. Challenge of the 21st Century, p. 4. Available at <<http://www.fao.org/nr/water/docs/escarcity.pdf>>.

325 See also: Matthew E. SANDERSON: Globalization and the Environment. Implications for Human Migration, in: Human Ecology Review 16 (2009) 1, p. 93-102, p. 97-99.

326 Cf. Murari LAL et al.: Asia, in: James J. MCCARTHY et al. (eds.): Climate Change 2001: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge 2001, p. 533-590, p. 572.

decades.³²⁷ In Pakistan, shortages and maldistribution of arable land, forests and water have encouraged millions of people to move from the countryside to urban centers such as Karachi and Hyderabad.³²⁸ Moreover, climate change in the Sahel region and southern Africa causes water scarcity and drought, and affects millions of Africans.³²⁹ Many African cities are composed of a largely impoverished population that seeks to escape rural poverty and environmental risks.³³⁰ The United Nations project that, on a global scale, the number of people who live in urban slums will grow from its current level of 924 million people to 2 billion people over the next 30 years.³³¹ These processes of urbanization, however, do not decrease vulnerability to environmental disasters, as many slum areas are for instance constructed in floodplains and on land subject to subsidence.³³² On the contrary, slum dwellers are exposed to a variety of additional risks such as poor housing conditions, the increased incidence of infectious diseases, and high crime rates.³³³ In addition, extending slum settlements further contribute to environmental degradation. These few examples show that the nexus between poverty, the environment and migration can not be analyzed without taking into account interdependent feedback loops similar to those previously observed in the livestock sector. Therefore, it can be emphasized once more that employing a simplistic cause/effect paradigm does not appear to be a useful policy approach.

In light of the aforementioned challenges, however, the current refugee protection regime of the United Nations seems poorly prepared and underfunded. At present, the UNHCR deals with merely ten million refugees and it is doubtful whether this institution will be able to support a stream of refugees

327 Cf. LAL et al., loc. cit., p. 572. See also: Israt RAYHAN / Ulrike GROTE: Coping with Floods: Does Rural-Urban Migration Play any Role for Survival in rural Bangladesh?, in: *Journal of Identity and Migration Studies* 1 (2007) 2, p. 82-98, p. 82.

328 Cf. Thomas F. HOMER-DIXON: *Environment, Scarcity, and Violence*. Princeton 1999, p. 12.

329 Cf. UNISDR 2009, loc. cit., p. 2-12. See also: R. WARREN et al.: *Understanding the Regional Impacts of Climate Change*. Research Report Prepared for the Stern Review on the Economics of Climate Change (Tyndall Centre for Climate Change Research Working Paper 90). Norwich 2006, p. 6-9.

330 Cf. Camilla TOULMIN: *Climate Change in Africa*. London / New York 2009, p. 89.

331 Cf. Laura LITTLE / Chris COCKLIN: The Vulnerability of Urban Slum Dwellers to Global Environmental Change, in: Richard A. MATTHEW et al. (eds.): *Global Environmental Change and Human Security*. Massachusetts Institute of Technology 2010, p. 77-96, p. 77.

332 Cf. *ibid.*, p. 82-83.

333 Cf. *ibid.*, p. 84.

that, under some scenarios, is possibly twenty times larger.³³⁴ Furthermore, the current UNHCR mandate only covers refugees recognized under the provisions of the *Convention Relating to the Status of Refugees*. In this regard, the United Nations refugee regime is under constant pressure from industrialized countries that seek to maintain a restrictive interpretation of its provisions.³³⁵ Nonetheless, there are legitimate concerns about the feasibility of an ‘environmental refugee’ status, since decisions to migrate are always a result of multiple interactions and a single status would not be able to cover this diversity. Besides, migration is often a temporary coping strategy.³³⁶ A refugee status might thus not be helpful for those people who are forced to leave their homes and abstract away from the responsibility of governments to take care of their own populations.³³⁷ Environmentally induced migration is therefore “essentially a development issue”.³³⁸ Possible solutions may include long-term responses that aim to create alternative livelihoods and economic opportunities in close cooperation with affected communities and governments.

With a view to the looming threads of environmentally induced migration and resource scarcity, more and more attention is also drawn to the *security dimension* of environmental change.³³⁹ It is evident that there is a strong connection between the welfare of human societies and the state of the environment they live in. Consequently, international interest in how natural resources and the environment affect human security and violent conflicts (mostly of internal nature) has risen remarkably over the past years. A shortage of resources, such as land and water, or the uneven distribution of wealth and resources through inefficient political frameworks are important factors contributing to the outbreak and continuation of conflicts.³⁴⁰ In line with these

334 Cf. Frank BIERMANN / Ingrid BOAS: Protecting Climate Refugees: The Case for a Global Protocol, in: *Environment* 50 (2008) 6, p. 8-16, p. 8-9.

335 Cf. *ibid.*

336 Cf. GEMENNE / PATTIE / BOULHAROUF, loc. cit., p. 12.

337 Cf. *ibid.*

338 BIERMANN / BOAS, loc. cit., p. 9-10.

339 Cf. Richard A. MATTHEW: Resource Scarcity: Responding to the Security Challenge. International Peace Institute 2008, p. 3. Available at <<http://www.ipinst.org/media/pdf/publications/rscar0408.pdf>>.

340 Cf. Ian BANNON / Paul COLLIER (eds.): Natural Resources and violent conflict: Options and actions. World Bank 2003, p. ix-xi. See also: Bonn International Center for Conversion (BICC) 2007: Governing the Gift of Nature. Resource Conflict Monitor: The Links between Resource Governance, Conflict and Natural Resources (BICC Concept Paper), p. 16. *Conflict can be defined as the clashing of interests (positional differences) of some duration and magnitude between at least two parties that are determined to pursue their interests and win their cases.*

findings, the European Union recently stated that climate change, in particular, is a “threat multiplier which exacerbates existing trends, tensions and instability”.³⁴¹ Richard A. MATTHEW concludes that:

*In the years ahead, the mixed effects of climate change will likely be distributed along the fracture lines of inequality – people in Canada, Europe, Australia, and the United States being the prime beneficiaries of new agricultural opportunities and access to natural resources; those in much of Africa, South Asia, Southeast Asia, Central America, and small island states finding themselves facing a barrage of storms, droughts, heat waves, and microbial invaders.*³⁴²

Against this background, and bearing in mind the international efforts that have to be made in order to achieve the MDGs, the avoidance of conflicts remains a major political challenge. In addition, the relationship between natural resources, the environment and conflict is certainly “multidimensional and complex”.³⁴³ Nevertheless, three major impacts can be observed: natural resources and the environment can (1) *contribute to the outbreak of a conflict*, they can (2) *finance and sustain a conflict*, and they can (3) *undermine peacemaking efforts*.³⁴⁴ In the context of DLDD and climate change, it is important to keep in mind that “eight out of ten conflicts in the world are in drylands”.³⁴⁵ Often conflicts go along with natural disasters such as droughts, floods and high demographic pressure, and may occur over the direct use of scarce resources such as water, land, forests, and livestock.³⁴⁶ Conflicts ensue when the local demand for resources exceeds the available supply or when different kinds of land use compete with one another.³⁴⁷ Migrating populations, for instance, can put additional pressure on certain land units when livestock temporarily concentrate at

341 High Representative / European Commission 2008: Paper to the European Council: Climate Change and International Security (S113/08), p. 2.

342 MATTHEW, loc. cit., p. 4.

343 UNEP 2009: From conflict to peacebuilding. The role of natural resources and the environment, p. 6. Available at <http://www.unep.org/pdf/pcdmb_policy_01.pdf>.

344 Cf. *ibid.*, p. 5.

345 Global Perspectives 2010: Climate Change is Killing People in Drylands. Interview with UNCCD Executive Secretary Luc Gnacadja, in: <<http://www.indepthnews.net/news/news.php?key1=2010-03-01%2002:38:53&key2=1>> (31.03.2011), n. p.

346 Cf. UNEP 2009: From conflict to peacebuilding, loc. cit., p. 8-11.

347 Cf. *ibid.*, p. 8.

key resources such as water wells.³⁴⁸ Under these circumstances conflicts over water or grazing land may arise between migrants, nomads and sedentary farmers. Moreover, existing land tenure arrangements and policies may come under increased strain, giving rise to tensions and fuelling conflict between communities.³⁴⁹

Many examples show that a combination of environmental degradation, migration and conflict is particularly widespread in *African drylands*.³⁵⁰ Conflicts in African drylands vary in their scale, character and intensity. In large parts of the East African drylands, such as the 'Karamoja cluster'³⁵¹, conflicts include armed conflict, organized road banditry along major livestock marketing routes, violent cattle thefts and, above all, the struggle between and within communities over access to livelihood related resources.³⁵² Often these conflicts result in chronic insecurity as well as social, political and economic marginalization. Cattle thefts, meaning "the stealing of livestock without the consent of elders or the community", are the main type and manifestation of

348 Cf. Commission on Climate Change and Development, loc. cit., p. 4.

349 Cf. ibid.

350 Cf. European Union / UNDP 2004: Annex 4: Baseline Survey. Analysis of conflict as it relates to the production and marketing of drylands products: The case of Turkana (Kenya) and Karamoja (Uganda) cross-border sites (Improving Market Access for Drylands Commodities Project), p. 5. Available at: <http://www.undp.org/drylands/docs/marketaccess/Baselines-Conflict_and_Markets_Report.doc>. See also: Mary E. KING / Mohamed Awad OSMAN: Executive Summary, in: University for Peace (UPEACE): Environmental Degradation as a Cause of Conflict in Darfur. Addis Ababa 2006, p. 11-22, p. 12.

351 "The Karamoja cluster forms a big chunk of the East Africa drylands. The term 'Karamoja cluster' is in common use and has been employed for many years to describe the pastoral and agro-pastoral ethnic groups, most of whom share a common language, culture and geographical location straddling northern Uganda, northwestern Kenya, southeastern Sudan and southwestern Ethiopia [...] [t]he Karamoja cluster is basically arid and semi arid, making nomadic pastoralism the main and only viable economic activity and the main source of livelihood." See: European Union / UNDP 2004, loc. cit., p. 6.

352 Cf. European Union / UNDP 2004, loc. cit., p. 6. See also: Remy SIETCHIPING: Political Economy Of Land Access And Control Over Natural And Land-Based Resources: A Means For Conflicts Prevention And Management? (CGIAR International Workshop on Collective Action, Property Rights, and Conflict in Natural Resources Management). Siem Reap 2010, p. 9-10; and: Oluyede Clifford AJAYI et al.: How can collective action and customary laws help to manage conflicts over natural resource commons in rural communities? Case study of Zambia (CGIAR International Workshop on Collective Action, Property Rights, and Conflict in Natural Resources Management). Siem Reap 2010, p. 1; Janpeter SCHILLING / Jürgen SCHEFFRAN / P. Michael LINK: Climate Change and Land Use Conflicts in Northern Africa, in: Nova Acta Leopoldina NF 112 (2010) 384, p. 173-182, p. 175-179.

conflicts in these areas, which occur both within and across communities and also include cross-border thefts.³⁵³ Famine and prolonged drought often result in poverty, making cattle theft the only opportunity for restoring the herds and livelihoods of affected communities.³⁵⁴ In many cases, climatic stress or prolonged drought also force pastoral communities to move with their herds to grazing areas located in border areas or territories of other communities and thus contribute to the outbreak of violent clashes.³⁵⁵ Examples include countries such as Nigeria, Mali, Côte d'Ivoire, and the greater region of Darfur (Sudan), where conflicts between farmers and – sometimes hired – herders are a widespread phenomenon.³⁵⁶ Some analyses even claim that the Darfur conflict “started as a resource-based conflict between herdsman and farmers before transforming into a full-blown war that has claimed over 200.000 lives and rendered over a million people homeless”.³⁵⁷ Moreover, soil erosion and the depletion of productive lands as a result of an ongoing “desertification process in Darfur over the past several decades compelled a forced ecological migration and mass population movement southward in search of better con-

353 European Union / UNDP 2004, loc. cit., p. 8.

354 Cf. *ibid.*, p. 7.

355 Cf. *ibid.*, p. 11.

356 Cf. R. Solagberu ADISA / Oluwasegun A. ADENKULE: Farmer-Herdsman Conflicts: A Factor Analysis of Socio-economic Conflict Variables among Arable Crop Farmers in North Central Nigeria, in: *Journal of Human Ecology* 30 (2010) 1, p. 1-9, p. 7. See also: Tor A. BENJAMINSEN / Boubacar BA: Farmer-herder conflicts, pastoral marginalisation and corruption: a case study from the inland Niger delta of Mali, in: *The Geographical Journal* 175 (2009) 1, p. 71-81, p. 78-80; and: Thomas BASSETT: Hired Herders and Herd Management in Fulani Pastoralism (Northern Côte d'Ivoire), in: *Cahiers d'études africaines* 34 (1994) 133-135, p. 147-173, p. 158-161.

357 ADISA / ADENKULE, loc. cit., p. 1. See also: Kelly CAMPBELL: Negotiating Peace in Darfur (United States Institute for Peace Briefing). Washington 2008, p. 1. Available at <http://www.usip.org/files/resources/1_0.PDF>; and: Yassine Hassan SATTI: Pastoralists, Land Rights and Migration Routes. The Case of West Darfur State, in: Marcel LEROY (ed.): *Environment and Conflict in Africa. Reflections on Darfur*. UPEACE 2009, p. 259-270, p. 260. *This dichotomization of the Darfur conflict might be too simplistic, since it does not take into account recent tensions between different identity groups. However, thirty-three out of 41 conflict incidents (i.e. 80%) from 1932-2000 were caused by DLDD and related conflicts over access to resources such as water and grazing land. The parties to the conflicts were not ethnically divided in all cases.* See: Adam Azzain MOHAMED: Evaluating the Darfur Peace Agreement. A Call for an Alternative Approach to Crisis Management (Claude Ake Memorial Papers No. 6). Uppsala 2009, p. 19-21.

ditions for pastoral and activities and farming’’.³⁵⁸ The subsequent questions of land use and resource sharing have put peaceful coexistence in jeopardy and threatened the social cohesion of the entire population in the area.³⁵⁹ Thus, the situation was predestined to provoke violent conflicts over scarce resources. A study issued by the *University for Peace* in 2006 found that ecological imbalance, water scarcity, deforestation as well as the mismanagement of natural resources and a lack of cooperation between local groups have “contributed significantly” to the conflict.³⁶⁰

In addition, the environment itself appears to be a silent victim in conflict-torn dryland areas, which results in long-term and usually underestimated consequences for local populations. In some cases, the destruction of natural resources, such as forests and water wells, has even been used as a weapon of warfare and to demoralize people.³⁶¹ However, in most cases, the impact of conflict on the environment is ‘collateral’. These collateral impacts can be divided in three categories: direct, indirect and institutional impacts.³⁶² *Direct impacts* are caused by the physical destruction of ecosystems and can be related to the release of chemicals and debris generated by bomb damage to settlements, industrial sites or rural infrastructure.³⁶³ This kind of pollution does not only affect the country in conflict, but also neighboring states which share the same groundwater systems and are affected by the distribution of pollutants via air and rain.³⁶⁴ Damages may also result from the movement of troops, from landmines and other unexploded ordnance, and from weapons containing chemicals or depleted uranium.³⁶⁵ As the name suggests, *indirect impacts* and damages are not caused directly by military action, but by the reaction of the people affected by the conflict.³⁶⁶ Wars and conflicts disrupt normal socio-economic patterns. As a consequence, people have to find coping strategies

358 KING / OSMAN, loc. cit., p. 12.

359 Cf. *ibid.*

360 *Ibid.*

361 Cf. Richard W. FISHER: *The Environment and Military Strategy* (Air & Space Chronicles 2003), in: <www.airpower.maxwell.af.mil/airchronicles/cc/fisher.html> (31.03.2011), n. p.

362 Cf. UNEP 2009: *From conflict to peacebuilding*, loc. cit., p. 15.

363 Cf. *ibid.*, p. 15-17.

364 Cf. *ibid.*, p. 17-18.

365 Cf. *ibid.*, p. 15. See also: Jay Ram ADHIKARI / Bhim ADHIKARI: *Political Conflicts and Community Forestry: Understanding the Impact of the Decade-Long Armed Conflicts on Environment and Livelihood Security in Rural Nepal*. Consultative Group on International Agricultural Research (CGIAR) 2010, p. 3.

366 Cf. UNEP 2009: *From conflict to peacebuilding*, loc. cit., p. 15.

and oftentimes have to leave their homeland and move to refugee camps. According to the UNHCR data available for an estimated number of 2.1 million refugees in sub-Saharan Africa, six out of ten refugees live in camps.³⁶⁷



As the above picture³⁶⁸ indicates, refugee camps – without losing sight of the immense human tragedy involved – put enormous long-term pressure on the environment, since many people are living in a confined space without a real infrastructure, having the need for firewood, water and other resources.³⁶⁹ This again might cause conflict with the host communities as they see the basis of their livelihoods endangered. Those who are not able to flee also need to find a strategy to survive the breakdown of the government and the economy in times of war. Often the only way to finance their livelihoods is to convert natural resources into capital.³⁷⁰ In many cases, this strain results in land degradation, deforestation and damage “more persistent and widespread than the direct impacts of war”.³⁷¹ At the same time, there are many instances where *institutional impacts* can be observed. In times of war, the political system is eroded and the rule of law breaks down. Officials may slide into corruption, focusing on their own interests more than on the people’s needs.³⁷² This often

367 Cf. UNHCR 2010, loc. cit., p. 1 and 6.

368 Cf. UNEP Sudan Environmental Database, in: <http://postconflict.unep.ch/sudanreport/sudan_website/index_photos.php> (31.03.2011), n. p.

369 Cf. UNEP 2009: From conflict to peacebuilding, loc. cit., p. 15.

370 Cf. *ibid.*

371 Cf. *ibid.*

372 Cf. *ibid.* See also: Philippe Le BILLON: Buying peace or fuelling war: the role of corruption in armed conflicts, in: *Journal of International Development* 15 (2003), p. 413-426, p. 417.

contributes to widespread institutional failure in all sectors. Opportunistic entrepreneurs, for example, may be allowed to establish uncontrolled systems of resource exploitation, which are neither sustainable nor closely linked to the affected communities.³⁷³ Conflict is therefore likely to undercut environmentally friendly practices. Moreover, there are often no financial means for investment in water, waste management and energy, as public finances are diverted to military purposes.³⁷⁴ This corresponds with health and environmental contamination risks, which again threaten the livelihoods of people even after the war is over, since the environment might be severely polluted while being the central resource for the major part of the affected society.³⁷⁵

On the background of these dramatic trends, *environmental security*³⁷⁶ emerges as a constitutive paradigm of human, national and international security. Under the maxim of *securitizing the ground, grounding security*, the UNCCD calls for a political process of securitization of DLDD issues and the development of effective international strategies, national policies and local measures based on a diagnosis of complex interactions between natural and societal causes.³⁷⁷ It is evident that institutional deficits and improperly designed policies can exacerbate conflicts and aggravate the effects of climate change and DLDD.³⁷⁸ Thus, structural imbalances in resource distribution, land use and ownership are contentious issues. Land privatization, market liberalization, growth-oriented agricultural policies, agricultural intensification methods and sector development projects often tend to marginalize local communities and endanger the livelihoods of dryland populations, smallholder farmers, and pastoralist communities.³⁷⁹ Pastoral marginalization due to agricultural encroachment specifi-

373 Cf. UNEP 2009: From conflict to peacebuilding, loc. cit., p. 15.

374 Cf. ibid. See also: Philippe Le BILLON: The political ecology of war: natural resources and armed conflict, in: Political Geography 20 (2001), p. 561-584, p. 563.

375 Cf. UNEP 2009: From conflict to peacebuilding, loc. cit., p. 15.

376 *Since 1989, the environmental dimension of security has gradually evolved from a policy debate and a research agenda to a new international policy field involving major environment (UNEP), development (UNDP) and security organizations, such as the Organization for Security and Co-operation in Europe (OSCE) and the North Atlantic Treaty Organization (NATO). The concept of environmental security addresses the interrelations between the environment and the security of humans and nature.* See: BRAUCH / OSWALD SPRING, loc. cit., p. 6.

377 BRAUCH / OSWALD SPRING, loc. cit., p. 8.

378 Cf. E.F. LAMBIN et al.: Coupled human-environment system approaches to desertification, in: Achim RÖDER / Joachim HILL (eds.): Remote Sensing and Geoinformation Processing for Land Degradation Assessment. London 2009, p. 3-14, p. 5. See also: BILLON: The political ecology of war, loc. cit., p. 567.

379 Cf. LAMBIN et al., loc. cit., p. 5.

cally results from agricultural policies and land legislation favoring farmers.³⁸⁰ In addition, institutional aspects of traditional land tenure, such as equal sharing of land and splintering of herds due to traditional succession law, reduce management flexibility and increase the pressure upon dryland ecosystems.³⁸¹ In this regard, *securitizing the ground* implies creating a wider global political awareness for DLDD and their societal consequences, making combating DLDD a key international political commitment and, most importantly, upgrading DLDD to the security realm.³⁸² The approach essentially refers to two different aspects: (1) the land as a territory, meaning the traditional concept of *territorial security*, which is an important feature of sovereignty; (2) the land as soil that produces essential ecosystem services, including a new understanding of *soil security* as a concept that applies to economic, environmental and societal security dimensions.³⁸³ *Grounding security*, in turn, includes reactive and proactive short-, medium- and long-term strategies for mitigation and adaptation to ‘soil insecurity’ by exposing the manifold consequences of DLDD.

From a security perspective, however, the dynamics between DLDD and climate change also have severe consequences for the fields of *energy security* and *food security*. Given the fact that today 85% of the world’s farmers use less than two hectares of land and “[a]lmost half the jobs worldwide depend on fisheries, forests or agriculture”, climate change and DLDD create additional risks for international business companies and the poorest of the poor alike.³⁸⁴ The continuing migration of food production to areas of the world which are especially vulnerable to climate change impacts such as extreme weather events, may render global yields much more variable, leading to greater instability in production rates and trade flows.³⁸⁵ In addition, the high energy share in total crop production costs through fertilizer, chemicals and fuel prices directly relates agricultural commodity prices to crude oil prices.³⁸⁶ As a consequence, high crude oil prices push agricultural commodity prices upward.³⁸⁷ Moreover, the emergence of the *biofuels sector* has created “a new source of demand impacting on food markets through related land use changes”.³⁸⁸

380 Cf. BENJAMINSEN / BA, loc. cit., p. 78-80.

381 Cf. *ibid.*

382 Cf. BRAUCH / OSWALD SPRING, loc. cit., p. 6.

383 Cf. *ibid.*

384 Diego MARTINO et al., loc. cit., p. 4. See also: Paul POLAK: Out of poverty: what works when traditional approaches fail. San Francisco 2008, p. 173.

385 Cf. OECD / FAO 2010, loc. cit., p. 43.

386 Cf. *ibid.*, p. 42-43.

387 Cf. *ibid.*, p. 43.

388 Cf. *ibid.*

Within the context of food insecurity, DLDD and climate change, the biofuels sector can therefore be regarded as a key sector that is of considerable importance for the UNCCD. The issue of biofuels, however, has so far been incoherently addressed under the Convention. On the one hand, the *High-Level Policy Dialogue on the Strategic Orientations of the UNCCD*, held in May 2008, concludes that today's global challenges "comprise the threats of climate change, environmentally induced migration, the food crisis, the rising demand for biofuels, conflicts in the drylands, and poverty".³⁸⁹ On the other hand, the *African Commodity Atlas*, jointly published by the UNCCD Secretariat and the Common Fund For Commodities in 2009, states that biofuels "contribute to environmental protection because they do not add to carbon dioxide (CO₂) emissions [...] [and] create new jobs in the rural economy".³⁹⁰ Several of the objectives and outcomes of The Strategy also indirectly point to a potential role of the Convention and its Parties in the "development of biofuel-related opportunities in rural drylands".³⁹¹ Likewise, the framework for the implementation of The Strategy attributes roles to several UNCCD institutions that are likely to be "relevant for biofuel-related issues".³⁹² Therefore, a study of the biofuels sector is particularly well suited for demonstrating the linkages and interdependent feedback loops between human well-being, energy security, food security and environmental degradation. However, due to the primary focus of this volume, a detailed analysis of trade policies, trade opportunities and trade barriers in the agricultural and bioenergy sector has not been attempted. The following chapter nevertheless aims to identify those aspects and dimensions which are relevant for UNCCD policies.

389 UNCCD 2008: Outcome of the High-Level Policy Dialogue on the Strategic Orientations of the United Nations Convention to Combat Desertification, held in Bonn, Germany, 27 May 2008 (CCD/CRIC(7)/INF.4), p. 3. Available at <<http://www.unccd.int/cop/officialdocs/cric7/pdf/cricINF4-eng.pdf>>.

390 UNCCD / Common Fund For Commodities 2009: African Drylands Commodity Atlas (Published in Cooperation with the Intergovernmental Group on Grains of the FAO and the International Crops Research Institute for the Semi-Arid Tropics). Available at <<http://www.unccd.int/knowledge/docs/Atlas%20web.pdf>>.

391 Marc PAQUIN / Karel MAYRAND: Advocacy for Sustainable Biofuels – Roles and Functions for UNCCD Actors in the Light of the 10-Year Strategic Plan. Unisféra International Centre / GTZ 2007, p. 4. Available at <http://unisfera.org/IMG/pdf/Unisfera_-_Biofuels_Paper_final.pdf>. For further details on the corresponding passages in the Strategy, see also page 9-12 of the document cited above.

392 Ibid.

4.1.3 Mapping the Linkages: The Case of Biofuels

In recent years, energy efficiency programs targeting the agricultural sector have become more prevalent worldwide. It is commonly recognized that confronting the need to reduce GHG emissions and promoting environmental sustainability is a paramount challenge for the international community. But while the current energy situation presents the world with new opportunities for sustainable ecologic and economic development, it also carries significant risks. The global food crisis has highlighted inherent problems that exist with regard to the agricultural food sector. Skeptics argue that biofuel production will threaten food supplies for the poor and fail to achieve the environmental benefits claimed. Biofuels are therefore often referred to as ‘agrofuels’, following the lead of non-governmental organizations and social movements who are of the conviction that the prefix ‘bio’, a derivation from the Greek word for ‘life’ (βίος), is entirely inappropriate since it gives a false idea of green energy. The term agrofuels expresses what they say is really happening: “agribusiness producing fuel from plants to sustain a wasteful, destructive and unjust global economy”.³⁹³ Since the issue of bioenergy has generated an enormous amount of interest and controversy, it has been the subject of debate at recent high-level intergovernmental meetings, including the ECOSOC *High-Level session on the Global Food Crisis* and the FAO *High-Level Conference on World Food Security*, held 3-5 June 2008 in Rome.³⁹⁴ Léo MÉRORÈS, the former President of the United Nations ECOSOC, pointed out that “agriculture has to be put back in the center of the development agenda”³⁹⁵, as he opened the Council’s special meeting on the global food crisis on 20 May 2008. Additionally, the 2008 World Development Report, entitled *Agriculture for Development*, underscored the gravity of the situation.³⁹⁶ The World Bank’s flagship report exposed that “few current biofuels programs are economically viable, and most have social and environmental costs: upward pressure on food prices, intensified competition for land and water, and possibly, deforestation”.³⁹⁷

393 GRAIN 2007: Editorial, in: Seedling (October 2007), p. 1. Available at <http://www.grain.org/seedling_files/seed-07-10.pdf>.

394 Cf. ECOSOC 2008: High-level Segment Thematic Debate on Rural Development. Bioenergy, sustainable livelihoods and the rural poor, p. 2.

395 ECOSOC 2008: Opening remarks by H.E. Mr. Léo Mérorès, President of ECOSOC. ECOSOC special meeting on the global food crisis 20 May 2008, p. 2. Available at <http://www.un.org/en/ecosoc/president/statements_merores.shtml>.

396 Cf. World Bank 2007: World Development Report 2008: Agriculture for Development. Available at <http://siteresources.worldbank.org/INTWDR2008/Resources/WDR_00_book.pdf>.

397 Ibid., p. 70.

Moreover, the *World Food Summit*, held in Rome on 16-18 November 2009, called for “a reversal of the decline in domestic and international funding for agriculture and a proactive approach to the challenges of climate change”.³⁹⁸ Against this background, there are three sets of core issues that emerge relating to the rapid development of agricultural energy in both small- and large-scale applications: (1) the technical potential of biofuels and related GHG emissions; (2) the challenges for sustainable development, particularly with regard to the risks and opportunities of biofuel production for the rural poor; and (3) the linkages between agriculture-based energy production, food security, and climate change.

Biofuels are liquid fuels, notably biodiesel and bioethanol. Biodiesel is made from oilseed crops such as those obtained from oil palm trees, *Jatropha curcas*³⁹⁹ plants, rapeseed, sunflower seed, and soybean, but some is also made from tallow, used cooking oil and even fish oil.⁴⁰⁰ Ethanol is another name for ethyl alcohol (C₂H₅O₂H), mostly made from the starch in corn kernels or the juice in sugarcane.⁴⁰¹ After fermentation and distillation, the bioethanol can be mixed with petrol or gasoline in various proportions. *First-generation* biofuels are those biofuels that rely on food crops as their primary feedstock (like biodiesel and bioethanol). *Second-generation* biofuels are aimed at using ‘lignocellulosic’ biomass like plants, trees, agricultural residues, and municipal solid waste to produce diesel-substitute fuels, and may involve industrial technologies such as genetically modified microorganisms, crops or trees.⁴⁰² Two types of second-generation processes are currently under development: (1) Firstly, the gasifica-

398 OECD / FAO 2010, loc. cit., p. 44.

399 *Jatropha curcas* has been promoted as a ‘miracle’ biofuel crop that grows well on marginal land and can produce high yields on poor soils. Moreover, it has been claimed that *Jatropha* could be a source of additional farm income for rural farmers, and a potential driver of rural development. However, case studies from Mozambique have shown that almost all *Jatropha* plants in Mozambique have been planted on arable land, with fertilizers and pesticides, but have still fallen short of the claimed growth rates and yields. Moreover, *Jatropha* is often criticized for being planted in direct replacement of food crops by subsistence farmers and thus endangering food security. See: Justiça Ambiental / Uniao Nacional de Camponeses 2009: *Jatropha! A socio-economic pitfall for Mozambique*, p. 6-8. Available at <http://www.evb.ch/cm_data/Report_Jatropha_JA_and_UNAC_klein.pdf>.

400 Cf. Richard DOORNBOSCH / Ronald STEENBLICK: *Biofuels: is the cure worse than the disease?* OECD Round Table on Sustainable Development (SG/SD/RT(2007)3/REV1). Paris 2007, p. 10.

401 Cf. Energy Future Coalition / United Nations Foundation (n. d.): *The Biofuels FAQ*, p. 6. Available at <http://www.globalproblems-globalsolutions-files.org/unf_website/PDF/biofuels_faq.pdf>.

402 Cf. DOORNBOSCH / STEENBLICK, loc. cit., p. 11.

tion of lignocellulosic biomass and the further transformation of the gas to a liquid, mainly using the so-called 'Fischer-Tropsch Process' (Biomass-to-Liquid or BtL).⁴⁰³ Possible target fuels include methanol, synthetic diesel and gasoline (the latter two produced using the 'Fischer-Tropsch Process'), DME (dimethyl ether – a potential alternative fuel for diesel engines), and gaseous fuels such as methane (CH₄) and hydrogen.⁴⁰⁴ DME and gaseous fuels are not compatible with today's gasoline or diesel vehicles and would need both new types of vehicles and a new refueling infrastructure.⁴⁰⁵ (2) Secondly, the production of 'cellulosic' ethanol, which can be made from low-cost feedstocks, including sawdust, forest thinnings, waste paper, grasses and farm residues (e.g. corn stalks, wheat straw, and rice straw).⁴⁰⁶ Fast-growing woody plants, switchgrass and other perennial grasses are also considered to be promising sources of cellulosic ethanol.⁴⁰⁷ Both generations (see figure 5) set out to provide fuel on an industrial and large scale for electricity production and transportation. However, their potential is still limited and 'second generation' technologies will not be commercially available for at least a decade.⁴⁰⁸ The latest available statistics by the OECD and IEA show that the global production of liquid biomass-based fuels used for transport purposes reached 0.8 exajoule⁴⁰⁹ (EJ) in 2005, representing only 1% of total road transport fuel consumption in energy terms.⁴¹⁰ The IPCC furthermore estimates that biomass, in general, provides approximately 10% of the global primary energy supply or 46 EJ per year (for comparison, current fossil energy use totals 388 EJ per year).⁴¹¹ In the short to medium term, UNEP projections expect biomass and

403 Cf. DOORNBOSCH / STEENBLICK, loc. cit., p. 11.

404 Cf. International Energy Agency 2004: Biofuels for Transport. An International Perspective, p. 43-47.

405 Cf. *ibid.*

406 Cf. Energy Future Coalition / United Nations Foundation (n. d.), loc. cit., p. 12.

407 Cf. *ibid.*

408 Cf. Eric HOLT-GIMENÉZ / Raj PATEL: Food Rebellions! Crisis and the Hunger for Justice. Institute for Food and Development Policy 2009, p. 78.

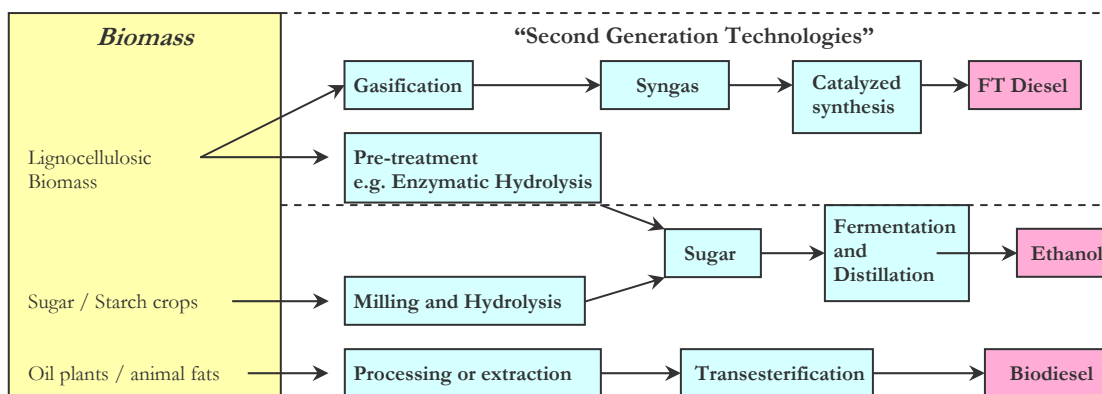
409 *An exajoule (EJ) is a unit of energy equal to 10¹⁸ joules.*

410 Cf. OECD / International Energy Agency 2006: World Energy Outlook 2006, p. 387. Available at <<http://www.iea.org/textbase/nppdf/free/2006/weo2006.pdf>>. See also: DOORNBOSCH / STEENBLICK, loc. cit., p. 10.

411 Cf. Ralph E.H. SIMS et al.: Energy Supply, in: B. METZ et al. (eds.): Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge 2007, p. 251-322, p. 276. See also: UNEP 2009: Towards the sustainable production and use of resources: Assessing Biofuels. Available at <http://www.unep.fr/scp/rpanel/pdf/assessing_biofuels_full_report.pdf>.

waste to contribute 56 EJ per year in 2015 and 68 EJ per year in 2030.⁴¹² Under these scenarios, biofuels for transport would increase from 0.8 EJ in 2005 to 2.4 EJ in 2015, and 4.3 EJ in 2030.⁴¹³ According to the OECD, about 20 EJ from conventional ethanol and biodiesel, or approximately 11% of total demand for liquid fuels in the transport sector, has been ‘judged possible’ by 2050.⁴¹⁴ Nevertheless, these estimates critically depend on assumptions about crop yields and available land for the production of biomass.⁴¹⁵ Today, the most important liquid biofuels in use are ethanol, biodiesel and (to a lesser extent) methane gas for use in transport. Moreover, so-called *third-* and *fourth-generation* fuel technologies are currently under development, involving the industrial production of fuel directly from genetically engineered microorganisms such as algae, using CO₂ as their feedstock.⁴¹⁶ These new technologies would be able to further increase the total share of biomass-based fuels in total road transport fuel consumption.

Figure 5: Biofuel Production Pathways



(Source: DOORNBOSCH / STEENBLICK, loc. cit., p. 11.)

With regard to climate change policy frameworks, biofuels are still being touted as one of the solutions to the emerging world energy crisis and the problem of global warming caused by GHG emissions. Nevertheless, most analyses show that biofuel production “involves considerable emission of greenhouse gases from soils, carbon sink destruction and fossil fuel inputs,

412 Cf. UNEP 2009: Assessing Biofuels, loc. cit., p. 18 and 39.

413 Cf. *ibid.*, p. 39.

414 Cf. DOORNBOSCH / STEENBLICK, loc. cit., p. 4.

415 Cf. UNEP 2009: Assessing Biofuels, loc. cit., p. 39.

416 For further detail, see: Fatih DEMIRBAS: Biorefineries for biofuel upgrading: A critical review, in: Applied Energy 86 (2009) 1, p. 151-161.

and is already causing significant deforestation and destruction of biodiversity".⁴¹⁷ The greenhouse gas and sustainability impacts of different fuel or plant types can vary significantly though, depending, among other factors, on the system of cultivation, processing, and transportation of feedstock.⁴¹⁸ Thus, so-called 'life-cycle-assessments' are necessary to look beyond the simple combustion process and determine particular carbon savings for different types of biofuels as well as negative impacts on ecosystems.⁴¹⁹ Life-cycle-assessments are highly complex and considerable methodological and factual uncertainties exist in regard to the impacts of biofuel production on ecosystems.⁴²⁰ However, the claimed GHG savings of particular biofuel types are significantly altered, if the indirect effects of land use change, the subsequent GHG emissions and consequences for biodiversity are accounted for.⁴²¹ Moreover, using 'second-generation' biofuels might not deliver the often claimed benefits and be dangerous for the world's topsoil, since soil biodiversity and agricultural productivity continually decline as topsoil is lost and residues are removed.⁴²² A recent study conducted by UNEP concludes:

*As long as the global cropland required for agricultural based consumption grows, displacement effects, land conversion and related direct and indirect impacts may not be avoided through selected production standards for biofuels [...] Modeling the future biodiversity balance for different crops on different land types has shown that GHG reductions from biofuel production would often not be enough to compensate for the biodiversity losses from increased land use conversion, not even within a time frame of several decades [sic].*⁴²³

417 Biofuelwatch et al. 2007: Agrofuels: Towards a reality check in nine key areas, p. 6-10. See also: CBD 2010: Report of the Second Meeting of the Ad Hoc Technical Expert Group on Biodiversity and Climate Change (UNEP/CBD/SBSTTA/14/INF/21), p. 8; and: Hira JHAMTANI / Elenita DANO: Biofuels: the illusion and the reality, in: Third World Resurgence 200 (2007), p. 6-10, p. 8-10.

418 Cf. Michael WANG/ May WU / Hong HUO: Life-cycle energy and greenhouse gas emission impacts of different corn ethanol plant types, in: Environmental Research Letters 2 (2007) 2, p. 11-13. See also: Mae-Wan HO: Biofuels: Biodevestation, hunger and false carbon credits, in: Third World Resurgence 200 (2007), p. 11-14, p. 11.

419 Cf. WANG/ WU / HUO, loc. cit., p. 12. See also: UNEP 2009: Assessing Biofuels, loc. cit., p. 17.

420 Cf. UNEP 2009: Assessing Biofuels, loc. cit., p. 17-19.

421 Cf. ibid.

422 Cf. Humberto BLANCO-CANQUI / Rattan LAL: Crop Residue Removal Impacts on Soil Productivity and Environmental Quality, in: Critical Reviews in Plant Sciences 28 (2009) 3, p. 139-163, p. 139.

423 Cf. UNEP 2009: Assessing Biofuels, loc. cit., p. 19.

Against this background, there are also considerable economic and social challenges ahead, particularly with regard to the large-scale industrial production of biofuels. On the one hand, the growing potential of biofuels is often seen as an opportunity for many rural regions around the world to generate income and employment by exporting agriculture-based fuels.⁴²⁴ On the other hand, the world's high demand for energy is no guarantee that small-scale farmers and the rural poor in developing countries will receive the benefits of biofuel production. Due to the fact that the current biofuel development is taking shape in a highly centralized manner in order to create economies of scale and meet the demands of market capitalism, social differences in both developing and transitioning societies are becoming more and more pronounced.⁴²⁵ Biofuel monocultures can marginalize the poor and may lead to human rights violations and conflicts related to land use. In Brazil for example, being the world's most advanced biofuels market for decades, the large-scale production of bioethanol is already affecting environmental and social change. Today, 70% of land under sugar cane cultivation for biofuel production is "owned by 340 industrial-scale mills, with average holdings of 30.000 ha and the remaining 30% is owned by 60.000 smaller scale land owners, with average holdings of 27.5 ha".⁴²⁶ Thus, many citizen organizations in Brazil claim that, as the ethanol industry expands, "existing problems in rural areas of landlessness, hunger, unemployment, environmental degradation, and agrarian conflicts will be exacerbated".⁴²⁷ Based on the above mentioned grievances such as labour exploitation and land-tenure issues, several NGOs in Brazil describe the sugar industry as a classic example of the social and economic dynamics in rural ar-

424 Cf. Alexander MÜLLER: Biofuels – driver of rural development?, in: *Rural 21: The International Journal for Rural Development* 42 (2008) 3, p. 12-15, p. 14-15.

425 Cf. Biofuelwatch et al. 2007, loc. cit., p. 24.

426 Commission on Sustainable Development (CSD) 2008: *Land and Vulnerable People in a World of Change. An Appeal for Collective Action* (International Land Coalition Issues paper for CSD Session 16), p. 3.

427 Isabella KENFIELD: *Brazil's Ethanol Plan Breeds Rural Poverty, Environmental Degradation* (Americas Program International Relations Center), in: <<http://www.globalresearch.ca/index.php?context=va&aid=5012>> (31.03.2011), n. p. See also: HOLT-GIMENÉZ / PATEL, loc. cit., p. 104-105; and: Corrina STEWARD et al.: *Fueling Disaster: A Community Food Security Perspective on Agrofuels*. Community Food Security Coalition International Links Committee 2007, p. 8-11; Philip M. FEARNside: *Land-Tenure Issues as Factors in Environmental Destruction in Brazilian Amazonia: The Case of Southern Pará*. Instituto Nacional de Pesquisas da Amazônia 2001, p. 1; Cynthia SIMMONS: *Doing it for themselves: Direct Action Land Reform in the Brazilian Amazon*, in: *World Development* 38 (2010) 3, p. 429-444.

eas that have developed from sugarcane production since the colonial era.⁴²⁸ In this respect, however, Brazil is just one example that highlights the critical land issues connected to the biofuel sector. Conflicts over land may also occur because of the large-scale acquisition of land for biofuel production – often referred to as ‘land grabbing’.⁴²⁹ *Land grabbing* can be broadly described as the large-scale land acquisition (whether purchases, leases or other) of land areas over 1.000 hectare as forms of investment in land-related projects by both international and domestic investors.⁴³⁰ Such acquisitions usually do not only include the purchase of ownership rights, but also of land use rights.⁴³¹ In their basic form, these kinds of deals involve at least two parties:

*On the one hand, there is an acquirer. In the African context, this is generally a private or joint equity company, but it can also be a foreign government acquiring land directly. On the other side of the deal is a land provider, either a government or, much more rarely, a private land-owner.*⁴³²

Currently, international investors and governments are acquiring significant land tracts for biofuel production in countries such as Ethiopia, Madagascar, Mali, Mozambique, Ghana, South Africa, Zimbabwe and Tanzania.⁴³³ Similar developments can also be observed for other commodities, such as food crops.⁴³⁴ Against this background, land tenure insecurity is not only threatening those who are not able to defend themselves, it is “increasingly a socio-political condition brought about by inappropriate policies and legal systems

428 Global Forest Coalition et al. 2006: Biofuels: A Disaster in the Making, p. 1.

429 Prosper B. MATONDI / Mandivamba RUKUNI: Land Outsourcing and Agro-Investment in Africa. Rebuilding Capacity for Policy Analysis and ‘Propoor’ Policy Making in Africa. Harare 2010, p. 1.

430 Cf. *ibid.*, p. 1. See also: Lorenzo COTULA et al.: Land Grab or Development Opportunity? Agricultural Investment And International Land Deals In Africa. International Institute for Environment and Development (IIED) / FAO / International Fund for Agricultural Development (IFAD) 2009, p. 3.

431 Cf. MATONDI / RUKUNI, loc. cit., p. 1.

432 *Ibid.*

433 Cf. COTULA et al., loc. cit., p. 4. See also: Joachim VON BRAUN / Ruth MEINZENDICK: “Land Grabbing” by Foreign Investors in Developing Countries: Risks and Opportunities (IFPRI Policy Brief 13). IFPRI 2009, p. 8-9. Available at <<http://www.ifpri.org/sites/default/files/publications/bp013all.pdf>>; and: Sonja VERMEULEN / Lorenzo COTULA: Making the most of agricultural investment: A survey of business models that provide opportunities for smallholders. FAO / IIED 2010, p. 20. Available at <<http://www.fao.org/docrep/012/a1297e/a1297e00.pdf>>; MATONDI / RUKUNI, loc. cit., p. 5.

434 Cf. MATONDI / RUKUNI, loc. cit., p. 3.

governing land [...] resulting in millions of poorer land users becoming unable to gain legally recognized rights to land upon which they depend for their livelihoods”.⁴³⁵ As these parallel trends converge, the demand of the expanding biofuel industry turns into a neuralgic point for international commodity markets and affects international food security.⁴³⁶ The FAO gives the following definition of food security: “Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life”.⁴³⁷ These aspects are influenced by income and consumer demand, production and what the producers offer, as well as by prices and price stability on the commodity markets.⁴³⁸ However, surging food and energy prices often have crucial implications for the livelihoods of the poor by placing their food security and nutrition at high risk.⁴³⁹ The United Nations Children’s Fund (UNICEF) Report 2010 states that:

*In South Asia alone, 400 million people suffered from hunger in 2009 – around one quarter more than the regional average for the period 2004-2006 [...] [h]igh food prices have further strained household budgets, raising the risk that vulnerable families may suspend their children’s education and resort to coping mechanisms to bolster family income [...] For countries presently in, or recently recovering from emergencies, elevated food prices and fuel price volatility can exacerbate an already difficult situation.*⁴⁴⁰

Thus, hunger is basically an *economic* phenomenon. People suffer from hunger because they lack the purchasing power to buy enough food for their families.⁴⁴¹ In addition, the challenge that countries face when it comes to fulfilling the human right to food is not just to achieve food security but to achieve genuine *food sovereignty* through autonomous control of the food acquisition process and the right to define agrarian policies in a way that excludes extreme

435 CSD 2008, loc. cit., p. 2.

436 Cf. COTULA et al., loc. cit., p. 54.

437 FAO 2003: Trade Reforms and Food Security. Conceptualizing the linkages, p. 29. Available at <ftp://ftp.fao.org/docrep/fao/005/y4671e/y4671e00.pdf>.

438 Cf. Michael BÜNTRUP: Global trends in food security, in: Rural 21: The International Journal for Rural Development 42 (2008) 3, p. 8-11, p. 8.

439 Cf. Joachim VON BRAUN: Rising world food prices: impact on the poor, in: Rural 21: The International Journal for Rural Development 42 (2008) 3, p. 19-21, p. 19.

440 UNICEF 2010: UNICEF Humanitarian Action Report 2010. Partnering for children in emergencies, p. 2-3.

441 Cf. Stefan TANGERMANN: Biofuels and food security, in: Rural 21: The International Journal for Rural Development 42 (2008) 2, p. 30-32, p. 31.

price volatility due to price dumping or commodities market speculation.⁴⁴² It is evident, however, that serious changes are beginning to emerge in all agricultural sub-sectors, which affect the global food situation.⁴⁴³ One key question that needs to be addressed in this context is therefore whether workable conclusions about long-term trends can be drawn from the cacophony of information on the so-called *'food versus fuel'* debate, especially with regard to the production and promotion of agriculture-based fuels. Due to rising oil prices, national energy security concerns and climate change policies, many countries currently envisage strong increases in bioenergy and especially biofuels.⁴⁴⁴ If some basic trends, such as climate change, the growing demand from burgeoning economies, population growth, fluctuating exchange rates, national export bans of food⁴⁴⁵, the high energy share in total crop production costs, and tariff barriers⁴⁴⁶ around regional biofuel markets are assumed to be given, prices for agricultural commodities, despite a slight recovery on the supply

442 Cf. Social Watch 2007: Social Watch Report 2007: In dignity and rights. Making the universal right to social security a reality. A citizens' global progress report on poverty eradication and gender equity, p. 95. See also: Institute for Agriculture and Trade Policy 2008: Commodities Market Speculation: The Risk to Food Security and Agriculture, p. 4. *"Prices are particularly vulnerable to being moved by big speculative 'bets' when a commodity's supply and demand relationship is 'tight' due to production failures, high demand and/or lack of supply management mechanisms."*

443 Cf. BÜNTRUP, loc. cit., p. 11. See also: OECD / FAO 2010, loc. cit., p. 43.

444 Cf. Birger KERCKOW: Competition between agricultural and renewable energy production, in: Quarterly Journal of International Agriculture 46 (2007) 4 (special issue), p. 333-347, p. 334. See also: COTULA et al., loc. cit., p. 5.

445 Cf. Jean-Pierre CHAUFFOUR: Global Food Price Crisis: Trade Policy Origins and Options. World Bank 2008, p. 4. See also: David L. TSCHIRLEY / T.S. JAYNE: Exploring the Logic Behind Southern Africa's Food Crises, in: World Development 38 (2010) 1, p. 76-87, p. 77; and: Lian Pin KOH / Jaboury GHAZOU: Biofuels, biodiversity, and people: Understanding the conflicts and finding opportunities, in: Biological Conservation 141 (2008), p. 2450-2460, p. 2456; OECD / FAO 2010, loc. cit., p. 57.

446 *"A tariff is a tax (often called a 'customs duty') on an import paid for by the exporter (the cost is expected to be passed on in the final retail price, making the import relatively more expensive than it would otherwise be). A tariff may be either a fixed charge per unit of product imported (specific tariff) or a fixed percentage of value (ad valorem tariff). A bound tariff rate is the maximum tariff a country is permitted to set under WTO agreements; applied tariffs are the tariffs actually implemented (they cannot be higher than the bound level but are often lower)."* For further information see: Corinna HAWKES / Sophia MURPHY: An Overview of Global Food Trade, in: Corinna HAWKES et al.: Trade, Food, Diet and Health. Perspectives and Policy Options. Oxford 2010, p. 16-32, p. 22; and: CHAUFFOUR, loc. cit., p. 2-3.

side in 2010, are likely to be exceedingly volatile in the future.⁴⁴⁷ The International Food Policy Research Institute (IFPRI) projects that, by 2020, depending on different rates of biofuel expansion, the global price for corn will increase by 26% to 72%.⁴⁴⁸ In the immediate term, it seems to be very likely that the biofuel sector will further expand in response to demand from the more developed economies and mandated consumption targets for biofuels related to climate change policy frameworks.⁴⁴⁹ The OECD and FAO *Agricultural Outlook for 2008-2017* points to biofuels as “the largest source of new demand in decades and a strong factor underpinning the upward shift in agricultural commodity prices”.⁴⁵⁰ According to an internal World Bank note, leaked to the British newspaper *The Guardian*, the World Bank economist Donald MITCHELL finds that biofuels have caused three-quarters of the actual increase in world food prices from January 2002 to February 2008.⁴⁵¹ Jean ZIEGLER, the former United Nations *Special Rapporteur on the right to food* (2000-2008), even went as far as telling reporters in New York that “it is a crime against humanity to convert agricultural productive soil into soil which produces food stuff that will be burned into biofuel”.⁴⁵² In view of these statements, the debate that has emerged over the production of agriculture-based fuels has opened up spaces for discussion about the serious environ-

447 Cf. World Bank 2010: World Development Report, loc. cit., p. 134 and 168. See also: FAO 2010: Food Outlook June 2010. Global Market Analysis (Global information and early warning system on food and agriculture), p. 1; and: TANGERMANN, loc. cit., p. 30.

448 Cf. HOLT-GIMENÉZ / PATEL, loc. cit., p. 70. See also: Joachim VON BRAUN: Rising Food Prices Threaten the World's Poor People (IFPRI Press Room, 4 December 2007), p. 2. Available at <<http://www.ifpri.org/sites/default/files/pressrel20071204.pdf>>.

449 Cf. UNCTAD (n. d.): UNCTAD's position on biofuels policies and the global food crisis, in: <<http://www.unctad.org/Templates/Page.asp?intItemID=4526&lang=1>> (31.03.2011), n. p. *In most countries, the biofuel market functions on the basis of mandated amounts or voluntary blending targets: the law requires or recommends a certain percentage of biofuels to be mixed with fossil fuels*. See also: OECD / FAO 2010, loc. cit., p. 50.

450 OECD / FAO 2008: World Agricultural Outlook 2008-2017. Highlights, p. 11. Available at <<http://www.agri-outlook.org/dataoecd/54/15/40715381.pdf>>.

451 Cf. Meredith CASE: Food before fuel. The global food crisis should force governments to rethink plans to use biofuels as a green energy source (The Guardian Online 11 July 2008), in: <<http://gu.com/p/xnkvk>> (31.03.2011), n. p. See also: Donald MITCHELL: A Note on Rising Food Prices (8 April 2008), p. 1. Available at <<http://image.guardian.co.uk/sys-files/Environment/documents/2008/07/10/Bio-fuels.PDF>>.

452 United Nations News Centre 2007: UN independent rights expert calls for five-year freeze on biofuel production, in: <<http://www.un.org/apps/news/story.asp?NewsID=24434&Cr=food&Cr1=#>> (31.03.2011), n. p.

mental and social threads related to this issue. However, the interplay between the international commodity markets, biofuel production and climate change is far more complex. The relationship between biofuels and surging food prices should therefore be interpreted as a *policy and market failure* in the first place. Since the overproduction of subsidized grains during the last decades has led to a steady decline in market prices and profit margins for corporations, biofuels open up a new market space for overproduced commodities like sugar cane and corn.⁴⁵³ Moreover, biofuels increase the total amount of grain being traded and inflate the value of these commodities in both, food and fuel markets.⁴⁵⁴ They also allow corporate players to create and capture more value through additional processing steps.⁴⁵⁵ Related land ‘grabbing’ also has economic causes. First, direct access to production enables biofuel investors to avoid needing to buy their raw materials from the market where market prices include a share for traders.⁴⁵⁶ In addition, investors can secure their supply when market prices rise and export restrictions reduce supply to world markets. Second, land is still relatively cheap in Africa and expected to increase in value, which makes it an attractive investment option given that the global financial crisis has reduced the appeal of other investments.⁴⁵⁷ Third, many African countries view foreign investment in agriculture as capable of facilitating technological and infrastructure development, diversifying the local economy, and creating employment and food security.⁴⁵⁸ However, since the biofuel market basically integrates the world’s food and fuel markets “under one giant industrial roof” and economies of scale are required to produce biofuels that can compete with fossil fuels, farmers producing ‘cash crops’ are increasingly dependent on big international companies for their seeds, inputs, services, processing, and sale.⁴⁵⁹ Especially smallholder farmers in dryland areas will face considerable obstacles in trying to access supply chains and are

453 Cf. CHAUFFOUR, loc. cit., p. 1. See also: HOLT-GIMENÉZ / PATEL, loc. cit., p. 70; and: Asbjørn EIDE: The Right to Food and the Impact of Liquid Biofuels (Agrofuels). FAO 2009, p. 20-24; and: MATONDI / RUKUNI, loc. cit., p. 3.

454 Cf. HOLT-GIMENÉZ / PATEL, loc. cit., p. 70.

455 Cf. *ibid.*

456 Cf. COTULA et al., loc. cit., p. 57.

457 Cf. *ibid.*

458 Cf. HOLT-GIMENÉZ / PATEL, loc. cit., p. 72.

459 Cf. *ibid.*, p. 70-72.

likely to be “forced out of the market and off the land”.⁴⁶⁰ Arguably, it can be said that most land tenure policies in dryland areas are largely insufficient and may lead to conflicts over land use.⁴⁶¹

Another key barrier to biofuel production in dryland areas is clearly low access to financing. Competitive biofuel production is highly dependent on subsidies and volatile markets.⁴⁶² On the one hand, producers need working capital to purchase seeds and equipment as well as debt and equity financing to build biofuels businesses.⁴⁶³ On the other hand, consumers on local markets may also require credit to purchase biofuels for their private or business needs at terms and conditions matched to their economic situation.⁴⁶⁴ Without equitable financing schemes, however, biofuel production is likely to increase dependence instead of fostering ownership. The dynamics behind these problems are mainly related to economic policy failure. Industrial corporations are not compelled to pay fair market prices for crops, which would guarantee benefits for farmers and reduce subsidies.⁴⁶⁵ Instead, companies are speculating on the commodity markets: they are buying cheap crops if prices drop and withhold grain from the markets until prices rise up again.⁴⁶⁶ Smallholder engagement in agricultural production thus requires secure rights over land and strong representative bodies in negotiations with agribusiness.⁴⁶⁷ Given these

460 Cf. HOLT-GIMENÉZ / PATEL, loc. cit., p. 74.

461 Cf. United Nations Department of Economic and Social Affairs (DESA) 2007: Small-Scale Production and Use of Liquid Biofuels in Sub-Saharan Africa: Perspectives for Sustainable Development (DESA/DSD/2007/2), p. 30. Available at <http://www.un.org/esa/sustdev/csd/csd15/documents/csd15_bp2.pdf>. See also: Sonja VERMEULEN / Nathalie GOAD: Towards better practice in smallholder palm oil production. IIED 2006, p. 5. Available at <<http://www.iied.org/pubs/pdfs/13533IIED.pdf>>; and: Lorenzo COTULA: Land deals in Africa: What is in the contracts? IIED 2011, p. 1-3. Available at <<http://pubs.iied.org/pdfs/12568IIED.pdf>>.

462 Cf. VERMEULEN / COTULA, loc. cit., p. 13 and 34. See also: HOLT-GIMENÉZ / PATEL, loc. cit., p. 73; and: VERMEULEN / GOAD, loc. cit., p. 4-5.

463 Cf. DESA 2007, loc. cit., p. 30.

464 Cf. *ibid.*

465 Cf. HOLT-GIMENÉZ / PATEL, loc. cit., p. 73.

466 Cf. VERMEULEN / GOAD, loc. cit., p. 6. See also: VERMEULEN / COTULA, loc. cit., p. 35; and: HOLT-GIMENÉZ / PATEL, loc. cit., p. 76.

467 Cf. VERMEULEN / COTULA, loc. cit., p. 89.

considerations, the likely avenues by which small-scale producers of biofuels will access supply chains will be *contract farming*, *tenant farming* or *lease contracts*.⁴⁶⁸ In this context, a recent study conducted by the FAO and the IIED concludes that in cases “where economies of scale are significant, [i.e. biofuel production, note of the author] these models are likely to struggle in a competitive market”.⁴⁶⁹ Today, feedstock still is the largest cost of biofuel production.⁴⁷⁰ As a consequence, there will be constant downward pressure on prices, which results in pressure for producers to reduce production costs.⁴⁷¹ The main mechanisms for doing this are, for instance, introducing improved crop varieties, switching away from more diversified production systems to monocropping and moving to larger land holdings to achieve economies of scale. These mechanisms are often too difficult or risky for smaller scale producers.⁴⁷² Other mechanisms, namely increasing labour productivity without increasing wages, are also likely to be detrimental to poor households.⁴⁷³ This presents a serious challenge to identifying ‘pro-poor’ biofuels production systems.

In order to avoid some of these pitfalls, current agricultural policies often envisage biofuels crops to be planted on allegedly ‘marginal’ or ‘degraded’ lands rather than prime acreage, as it is thought that this kind of land may offer greater benefits and less social impacts amongst poor rural populations and indigenous people.⁴⁷⁴ However, recent scientific findings raise legitimate doubts about this policy approach since, in many cases, land which is per-

468 Cf. Leo PESKETT et al.: Biofuels, Agriculture and Poverty Reduction. UK Department for International Development (DfID) 2007, p. 11. Available at <<http://www.odi.org.uk/resources/download/2574.pdf>>. ‘Contract farming’ describes pre-agreed supply agreements between farmers and buyers. In exchange, the company provides credit, seeds, fertilizers, pesticides and technical advice – all of which may be charged against the final purchase price – and agrees to buy the produce supplied. ‘Tenant farming’ refers to management contracts in which smallholders work the land of large-scale agribusinesses or other farmers. ‘Lease contracts’ describe a variety of arrangements under which a farmer or farm management company work agricultural land belonging to someone else. See: VERMEULEN / COTULA, loc. cit., p. 4.

469 VERMEULEN / COTULA, loc. cit., p. 7.

470 Cf. PESKETT et al., loc. cit., p. 10. See also: F.O. Licht / Agra CEAS Consulting (n. d.): World Biodiesel Markets: The Outlook to 2010 (Brochure), p. 2.

471 Cf. PESKETT et al., loc. cit., p. 11.

472 Cf. *ibid.*

473 Cf. *ibid.*

474 Cf. COTULA et al., loc. cit., p. 60. See also: HOLT-GIMENÉZ / PATEL, loc. cit., p. 70; and: CBD 2008: Ninth meeting of the Conference of the Parties to the Convention on Biological Diversity: The Potential Impacts of Biofuels on Biodiversity (UNEP/CBD/COP/9/1), p. 6. Available at <<http://www.cbd.int/doc/meetings/cop/cop-09/official/cop-09-26-en.pdf>>.

ceived to be ‘abandoned’, ‘marginal’ or ‘degraded’ by governments and investors provides a vital basis for the livelihoods of poorer and vulnerable groups, including through crop farming, herding and gathering of natural resources.⁴⁷⁵ An assessment of market alternatives for smallholder farmers conducted by UNDP and the *International Policy Centre for Inclusive Growth* finds that “in countries where smallholder farmers concentrate on cash crops instead of staple foodstuffs, the threat to food security can be critical”.⁴⁷⁶ In this particular context, it seems to be rather worrisome that the UNCCD Executive Secretary, in a meeting with United Nations Secretary-General Ban Ki-moon, announced that “the UNCCD constitutes the international legal framework established by the international community to reclaim dry and degraded land which in present situation could contribute to producing more food as well as non-food biofuel”.⁴⁷⁷

Meanwhile, these economic and social trends have combined with unfavorable weather conditions in key food-producing countries that can be attributed to the effects of climate change and DLDD.⁴⁷⁸ As figure 6 demonstrates, climate change leads to a long-term decline in agricultural productivity and further contributes to food insecurity in dryland areas through geographical shifts in optimum crop-growing conditions, decreasing crop yields, reduced water resources for agriculture and human consumption, as well as damage and the loss of arable land through storms, floods, droughts, and rising sea levels.⁴⁷⁹ The World Development Report 2010 concludes that “[i]n parts of the developing world food insecurity and associated food price fluctuations already represent a systemic source of risk that is expected to increase with

475 Cf. MATONDI / RUKUNI, loc. cit., p. 8.

476 Danuta CHMIELEWSKA / Darana SOUZA: Market Alternatives for Smallholder Farmers in Food Security Initiatives: Lessons from the Brazilian Food Acquisition Programme (UNDP / International Policy Centre for Inclusive Growth Working Paper no. 64). Brasilia 2010, p. 9. Available at <<http://www.ipc-undp.org/pub/IPCWorkingPaper64.pdf>>.

477 UNCCD 2008: Press release: Secretary-General Meets Executive Secretary of Convention to Combat Desertification, p. 1. Available at <<http://www.unccd.int/documents/SGandEsCSD.pdf>>.

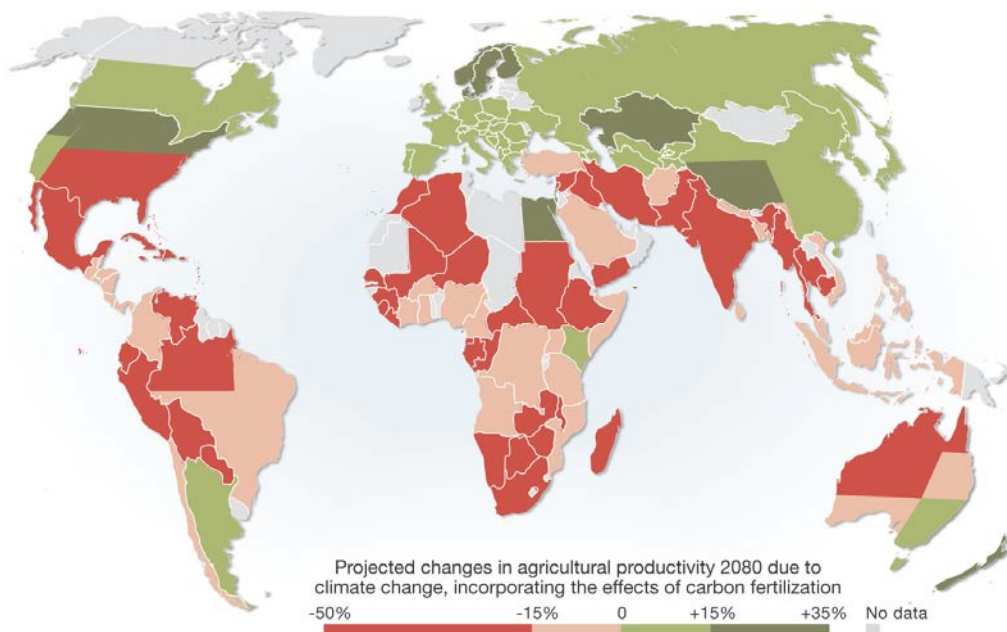
478 Cf. UNCTAD (n. d.): UNCTAD’s position on biofuels, loc. cit., n. p.

479 Cf. Ulisses CONFALONIERI et al.: Human Health, in: M.L. PARRY et al. (eds.): Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge 2007, p. 391-431, p. 413-414.

479 Cf. FEDOROFF et al., loc. cit., p. 833.

climate change”.⁴⁸⁰ The latest UNICEF Report states that “prolonged drought resulting from climate change is impacting food production, resulting in increasing nutrition insecurity”.⁴⁸¹ Moreover, the Food and Agriculture Organization of the United Nations reports that the FAO Food Price Index, a measure of the monthly change in international prices of a basket of food commodities, has continuously risen for the past seven years.⁴⁸²

Figure 6: Projected Changes in Agricultural Productivity due to Climate Change



(Source: UNEP/GRID-Arendal, Hugo Ahlenius)⁴⁸³

These findings imply that a thorough reassessment of biofuel-related UNCCD policies is needed to not only reduce exposure of dryland populations to rising

480 World Bank 2010: World Development Report, loc. cit., p. 107.

481 UNICEF 2010, loc. cit., p. 2.

482 Cf. FAO 2011: Annual Real Food Price Indices (1990-2011), loc. cit., n. p.

483 Cf. UNEP/GRID-Arendal 2008: Projected agriculture in 2080 due to climate change (UNEP/GRID-Arendal Maps and Graphics Library), in: <<http://maps.grida.no/go/graphic/projected-agriculture-in-2080-due-to-climate-change>> (31.03.2011), n. p. For further information on the complex phenomenon of carbon fertilization, see: Fan ZHAI / Juzhong ZHUANG: Agricultural Impact of Climate Change: A General Equilibrium Analysis with Special Reference to Southeast Asia (Asian Development Bank Institute Working Paper No. 131). Tokyo 2009, p. 2.

energy prices and environmental threats, but also to avoid adverse effects on sustained economic growth and food security in rural dryland regions. Increasing numbers of civil society groups from developing countries are rejecting the push for more monoculture and biofuel production.⁴⁸⁴ Thus, it is vital to re-examine the economically motivated paradigm that proposes biofuels as a ‘one-size-fits-all’ solution for the reduction of GHG emissions, rural poverty and the world’s energy needs. A recent study conducted by UNEP concludes that further research is needed on land-related issues such as (1) estimates on global land use change due to changing consumption patterns of food; (2) the realistic production potential and consequences of using degraded land for biofuel production; (3) the extent and potential of land, adequate crops and cultivation systems for biofuel production; (4) the assessment of whether land conversion makes more sense than allowing natural regeneration to occur; and (5) an assessment of ecologically friendly measures to increase yields, especially in sub-Saharan Africa.⁴⁸⁵ In summary, however, the example of biofuels impressively shows the indivisible connection between the political, biophysical and socio-economic aspects of land, soil, and climate change. Given the complexity of the above findings, the following section now aims to identify, synthesize and discuss overarching concepts and policy pathways to integrate the various aspects of DLDD into climate change policy frameworks. In addition, possible synergies and conflicts between existing policy frameworks will be addressed.

484 Cf. Biofuelwatch et al. 2007, loc. cit., p. 33.

485 Cf. UNEP 2009: Assessing Biofuels, loc. cit., p. 97-99.

4.2 Understanding Synergies and Conflicts: Ecosystem-based Approaches to Land, Soil and Climate Change

4.2.1 Ecosystem Services and Environmental Policy Integration

“We have entered a period of consequences.” – Al Gore

Today, there is growing consensus among business leaders, scholars and policy makers alike that challenges such as climate change, the current economic crisis and concerns about energy and food security call for the international community to rethink economic development strategies that are based on permanent growth, environmental destruction and natural resource depletion. Largely taken for granted, ecosystems provide a variety of goods and services that are critical to human well-being and make the planet inhabitable.⁴⁸⁶ It is important to understand that development trajectories which degrade ecosystems and impair their ability to provide services will create long-term costs that greatly exceed short-term, single sector gains.⁴⁸⁷ Ecosystem services therefore need to be an integral part of environmental policy frameworks that build on synergies, policy integration and sustainable development.⁴⁸⁸ In other words, “tastes may differ over beauty, but they are in firm accord over the high costs of polluted water and flooded homes”.⁴⁸⁹

Recognizing ecosystem services as an important political and ‘instrumental’ link between land, soil and climate change is therefore a precondition for co-operation and strategic planning. Nevertheless, it does not necessarily lead to synergies between existing governance architectures.⁴⁹⁰ Synergy, deriving from the Greek word ‘συνεργός’, essentially means working together.⁴⁹¹ The defini-

486 Cf. James SALZMAN / Barton H. THOMPSON / Gretchen C. DAILY: Protecting Ecosystem Services: Science, Economics, and Law, in: *Stanford Environmental Law Journal* 20 (2001) 309, p. 309-332, p. 310.

487 Cf. Joseph HANCOCK: The case for an ecosystem service approach to decision-making: an overview, in: *Bioscience Horizons* 3 (2010) 2, p. 188-196, p. 194.

488 Cf. Cagan H. SEKERCIOGLU: Ecosystem functions and services, in: Navjot S. SODHI / Paul R. EHRLICH (eds.): *Conservation Biology for All*. Oxford 2010, p. 45-72, p. 66.

489 SALZMAN / THOMPSON / DAILY, loc. cit., p. 312.

490 Cf. Björn-Ola LINNÉR: Authority Through Synergism: the Roles of Climate Change Linkages, in: *European Environment* 16 (2006), p. 278-289, p. 280. *The term “instrumental link” refers to linkages between issues that may spur institutional design and market mechanisms.* See: SALZMAN / THOMPSON / DAILY, loc. cit., p. 312.

491 Cf. LINNÉR, loc. cit., p. 279.

tion of synergy most commonly used is “a combined effect that exceeds the sum of individual effects”.⁴⁹² Pertaining to Multilateral Environmental Agreements, such as the Rio conventions, synergy is frequently understood as the effective coordination of activities among the implementing entities at multiple levels.⁴⁹³ Generally, there are different dimensions where synergies can be found. Drawing on reviews of existing policy and research, synergies can be tapped (1) *on a regulatory level*, (2) *on the institutional side*, (3) *on a financial level*, and by (4) *integrating, transferring and advancing knowledge*. However, while the prospect of synergies among the Rio conventions is frequently invoked by practitioners and scholars, there has been too little progress in translating this impulse from a conceptual consensus to theory-guided procedures and activities that can improve the actual implementation of MEAs and related sustainable development goals.⁴⁹⁴ On the one hand, synergies are often seen through the lenses of a single academic discipline such as ecology, political science, international environmental law, or economics. On the other hand, the ability to create synergies is often limited by simplifying dichotomies between local and global, public and private, science and lay, and the difficulty to incorporate increasingly hybridized phenomena into policy development.⁴⁹⁵ Thus, there is a growing need to bridge the gap between different ‘epistemic communities’ and combine traditional knowledge with national and international policy

492 UNDP 1997: Synergies in National Implementation. Based on the outcomes of an expert meeting on synergies among the Conventions on Climate Change, Biological Diversity, Desertification and Forest Principles, Sede Boquer, Israel, 17-20 March 1997, p. 1. See also: UNFCCC 2002: Annotated guidelines for the preparation of national adaptation programmes of action. Least Developed Countries Expert Group, p. 11. Available at <http://unfccc.int/files/cooperation_and_support/ldc/application/pdf/annguide.pdf>.

493 Cf. UNCCD 2006: Opportunities for Synergy among the Environmental Conventions: Results of National and Local Level Workshops. Edited by: David Mouat, Judith Lancaster, Ismail El-Bagouri, Fernando Santibañez, p. 12. Available at <<http://www.unccd.int/publicinfo/publications/docs/synergy.pdf>>. See also: UNEP 2010: Governing Council of the United Nations Environment Programme: Report of the Global Major Groups and Stakeholders Forum on the work of its eleventh session (UNEP/GCSF/11/1), Bali, Indonesia, 21-22 February 2010, p. 4.

494 Cf. Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH 2009: Planning to deliver: Making the Rio Conventions more effective on the ground. Edited by A. Sharma, p. 7.

495 Cf. ROSENAU, loc. cit., p. 48. See also: Thomas SIKOR (ed.): Public and private in natural resource governance: a false dichotomy? London 2008, p. 1-2; and: Sally EDEN: NGOs, the Science-lay Dichotomy, and Hybrid Spaces of Environmental Knowledge, in: Peter MEUSBURGER / David N. LIVINGSTONE / Heike JÖNS (eds.): Geographies of Science (Knowledge and Space 3). Heidelberg, London and New York 2010, p. 217-230, p. 217.

making.⁴⁹⁶ In the politicized and bureaucratic environment of international policy development, however, the complex feedback processes of trans-scalar governance often appear as simplistic ‘cause/effect’ or ‘top-down/bottom-up’ paradigms.⁴⁹⁷ Against this background, the question arises how research can be better connected with policy development. Furthermore, it needs to be assessed how capacity building, meaningful participation and the social impact of science can be facilitated. Due to the growing complexity of these tasks, research towards integrated environmental governance inherently requires inter- and transdisciplinary approaches that involve policy makers, scholars and society in problem solving. In this context, interdisciplinarity can be regarded as cooperation across different academic disciplines.⁴⁹⁸ Transdisciplinarity implies incorporating knowledge from different actors – professionals as well as lay persons – to develop practical solutions to real-life challenges.⁴⁹⁹

On a negotiation level, however, the issue of integrating climate change and sustainable development only gained traction since the adoption of Agenda 21 and during the follow-up of the ‘Rio process’, including the World Summit on Sustainable Development in 2002.⁵⁰⁰ In addition, the *Paris Declaration on Aid Effectiveness* and the *Accra Agenda for Action* called for a harmonized approach to

496 Cf. Rio Conventions 2010: Key Messages From the Inaugural Rio Conventions’ Ecosystems Pavilion. A Compilation From Nagoya, Japan, October 2010. Available at <<http://www.cbd.int/cooperation/pavilion/2010-11-22-key-messages-Nagoya-Pavilion-final-en.pdf>>, p. 3. See also: F. DANIELSEN et al.: Environmental monitoring: the scale and speed of implementation varies according to the degree of people’s involvement, in: *Journal of Applied Ecology* 47 (2010), p. 1166-1168, p. 1166.

497 Cf. Alon TAL / Jessica COHEN: Bridging “Top-Down” to “Bottom-Up”: A New Role for Environmental Legislation in Combating Desertification, in: *Harvard Environmental Law Review* 31 (2007) 1, p. 163-217, p. 215-217. Available at <http://www.law.harvard.edu/students/orgs/elr/vol31_1/tal-cohen.pdf>. See also: Daniel SAREWITZ: Political Effectiveness in Science and Technology, in: Martin CARRIER / Alfred NORDMAN (eds.): *Science in the Context of Application* (Boston Studies in the Philosophy of Science 274). Heidelberg, London and New York 2011, p. 301-315, p. 307-310.

498 Cf. Robert FRODEMAN (ed.) / Julie T. KLEIN / Carl MITCHAM: *The Oxford Handbook of Interdisciplinarity*. Oxford and New York 2010, p. xxx.

499 Cf. Julie T. KLEIN et al.: *Transdisciplinarity: Joint Problem Solving among Science, Technology, and Society. An Effective Way for Managing Complexity*. Basel, Boston and Berlin 2001, p. 4. See also: Philip LOWE / Geoff WHITMAN / Jeremy PHILIPSON: Ecology and the social sciences, in: *Journal of Applied Ecology* 46 (2009), p. 297-305, p. 297.

500 Cf. Imran Habib AHMAD: Climate Policy Integration: Towards Operationalization (DESA Working Paper No. 73). DESA 2009, p. 3. Available at <http://www.un.org/esa/desa/papers/2009/wp73_2009.pdf>.

climate change, food security and poverty reduction.⁵⁰¹ Yet the climate debate has been largely dominated by biophysical and environmental considerations and often neglected the interpretive social sciences.⁵⁰² Particularly the IPCC had to face frequent criticism for its inability to effectively address the linkages between climate change and sustainable development in its first two Assessment Reports, despite the recognition in the Article 3.4 of the UNFCCC that “[t]he Parties have a right to, and should, promote sustainable development”.⁵⁰³ Moreover, climate policy today is basically split into mitigation and adaptation, two main areas of operation, which are often addressed “in a largely separate fashion” within research and the political process associated with the UNFCCC.⁵⁰⁴ Adaptation, for instance, although taken into consideration from the outset of the UNFCCC, has been brought to the foreground of the climate negotiations only after the finalization of the Marrakech Accords in 2001.⁵⁰⁵

Eventually, the need to recognize climate change as a “classic cross-sectoral issue” and combine climate change policies with the sustainable development agenda has been discussed in the Third and Fourth Assessment Report of

501 Cf. OECD 2005/2008, loc. cit., p. 7 and 21.

502 Cf. Mike HULME / Martin MAHONY: Climate change: What do we know about the IPCC?, in: *Progress in Physical Geography* 34 (2010) 5, p. 705-718, p. 707.

503 United Nations 1992: United Nations Framework Convention on Climate Change. Text of the Convention (FCCC/INFORMAL/84), p. 5. Available at <<http://unfccc.int/resource/docs/convkp/conveng.pdf>>. See also: AHMAD, loc. cit., p. 5.

504 *The IPCC defines mitigation as “[t]echnological change and substitution that reduce resource inputs and emissions per unit of output. Although several social, economic and technological policies would produce an emission reduction, with respect to climate change, mitigation means implementing policies to reduce GHG emissions and enhance sinks.” Adaptation is defined as “[i]nitiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. Various types of adaptation exist, e.g. anticipatory and reactive, private and public, and autonomous and planned.”* See: Aviel VERBRUGGEN (ed.): Glossary, in: B. METZ et al. (eds.): *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge 2007, p. 809-822, p. 809 and 818; and: AHMAD, loc. cit., p. 3.

505 Cf. AHMAD, loc. cit., p. 3. *The ‘Marrakech Accords’ are a set of agreements reached at the seventh Conference of the Parties (COP7) to the UNFCCC in 2001 on the rules of meeting the targets set out in the ‘Kyoto Protocol’. The 1997 Kyoto Protocol is an international agreement linked to the UNFCCC. The major element of the Kyoto Protocol is that it sets binding targets for industrialized countries (called Annex I countries) for reducing greenhouse gas emissions. These amount to an average of 5% against 1990 levels over the five-year period 2008-2012.* See: UNFCCC (n. d.): Kyoto Protocol, in: <http://unfccc.int/kyoto_protocol/items/2830.php> (31.03.2011), n. p.

the IPCC.⁵⁰⁶ As a concept for climate policy integration across the areas of cost-effectiveness, equity and sustainable development, *mitigative capacity* and *adaptive capacity* emerged from the reports.⁵⁰⁷ According to the IPCC, “the ability to implement specific adaptation and mitigation measures is dependent upon the existence and nature of adaptive and mitigative capacity, which makes such measures possible and affects their extent and effectiveness”.⁵⁰⁸ Set against this context, the socio-economic aspects of climate change and development in the drylands came increasingly into focus of public interest and discourses.

From an institutional perspective, however, the pursuit of synergies between the governance architectures of land, soil and climate change is still impaired by the adverse effects of fragmentation. At the core of global climate governance is the UNFCCC, which, as of March 2011, has been ratified by 195 Parties, including the European Union.⁵⁰⁹ The UNFCCC consists of a considerable international bureaucracy for administrative support, data collection and policy development, including the IPCC, several expert groups and a *Subsidiary Body for Scientific and Technological Advice* (SBSTA). The SBSTA counsels the UNFCCC Conference of the Parties on matters of climate, the environment, and technology. Moreover, a *Subsidiary Body for Implementation* (SBI) helps review how the convention is being put into practice and also deals with financial and administrative matters.⁵¹⁰ In addition, the *Kyoto Protocol* is part of the larger climate convention and shares its basic norms.⁵¹¹ Accordingly, the architecture of global climate governance shows strong elements of ‘synergistic fragmentation’.⁵¹² Nonetheless, the Kyoto Protocol is clearly related to ele-

506 AHMAD, loc. cit., p. 2.

507 Cf. *ibid.*, loc. cit., p. 6.

508 Richard J.T. KLEIN et al. (eds.): Inter-relationships between adaptation and mitigation, in: M.L. PARRY et al. (eds.): *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge 2007, p. 745-778, p. 763.

509 Cf. UNFCCC (n. d.): Status of ratification, in: <http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.txt.php> (31.03.2011), n. p.

510 Cf. UNFCCC (n. d.): Essential Background. Bodies of the Framework Convention, Actors in the Negotiation Process, and the UNFCCC secretariat, in: <http://unfccc.int/essential_background/feeling_the_heat/items/2915.php> (31.03.2011), n. p. See also: BIERMANN et al.: *Architecture*, loc. cit., p. 20.

511 Cf. BIERMANN et al.: *Architecture*, loc. cit., p. 20.

512 Cf. *ibid.*

ments of ‘cooperative fragmentation’ as well.⁵¹³ On the one hand, the Kyoto Protocol sets binding targets for reducing GHG emissions only for a particular group of developed countries (Annex I countries). The nations which are Parties to the Kyoto Protocol, on the other hand, account for only 27% of global GHG emissions.⁵¹⁴ This imbalance, and the fact that the United States is only Party to the UNFCCC but has not ratified the Kyoto Protocol, creates a high degree of fragmentation and leads to separate negotiation tracks – one to extend and perpetuate the Kyoto Protocol while excluding the United States and developing countries from emission targets, and one to establish a post-2012 arrangement, with all countries making emissions reduction commitments and building a modified type of governance architecture.⁵¹⁵ In trying to move the UNFCCC process forward, the Parties to the convention therefore established an Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) to negotiate new emissions-reduction goals for industrialized countries prior to the end of the first commitment period for the Kyoto Protocol in 2012.⁵¹⁶ Furthermore, it was deemed necessary to create a parallel framework that would involve some corresponding commitment from the United States and the burgeoning economies.⁵¹⁷ To this end, the Parties launched the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA) to fully implement the convention’s objectives.⁵¹⁸ Besides, there are a number of institutional governance arrangements at different levels, for instance the *Dialogue on Climate Change, Clean Energy and Sustainable Development*, which acknowledge the United Nations process, but “do not provide for a coordination mechanism that could ensure mutual compatibility”.⁵¹⁹ Finally, the architecture of global climate governance also shows elements of ‘conflictive fragmentation’. Some initiatives that are supported by the United States, for example the *Asia-Pacific Partnership*

513 Cf. BIERMANN et al.: Architecture, loc. cit., p. 20.

514 Cf. Velma MCCOLL: After Cancún: Time to Shift Strategy, in: Policy Options (February 2011), p. 7-11, p. 8.

515 Cf. ibid. See also: BIERMANN et al.: Architecture, loc. cit., p. 20.

516 Cf. United Nations Economic Commission for Africa 2011: Meeting of the Committee of Experts of the 4th Joint Annual Meetings of the AU Conference of Ministers of Economy and Finance and ECA Conference of African Ministers of Finance, Planning and Economic Development (E/ECA/COE/30/12), Addis Ababa, Ethiopia, p. 1. Available at <<http://www.uneca.org/cfm/2011/documents/English/Outcome-of-theGlobalClimateConference.pdf>>.

517 Cf. ibid.

518 Cf. ibid.

519 BIERMANN et al.: Architecture, loc. cit., p. 21.

on *Clean Development and Climate*, were intentionally created as an interest-based counterpart to the Kyoto Protocol.⁵²⁰

Furthermore, different types of normative and institutional fragmentation within the governance architectures of land, soil and climate change mutually enforce each other. Against this background, the problem of *agency egoism* can be singled out as an obstacle to achieving synergy and policy coherence in these areas. Agency, which has been defined earlier in this volume as ‘authority and capacity to govern people and issue areas’, is constantly distributed and re-distributed between different actor coalitions and networks at multiple scales. Thus, agency theory might explain some of the underlying obstacles in achieving synergy, because each group of individuals at specific levels represents different agents, whose interests are served differently by an overarching strategy.⁵²¹ Apart from a lack of resources, a lack of harmonized terminology and classification, and a lack of continuity and stability in information flows, the development of thematic partnerships may also be hampered by professional relationships which are characterized by an adversarial attitude: ‘me vs. you’; ‘us vs. them’. This psychological aspect that receives a lot of attention in economic research, however, is seldom openly addressed in the context of political management. In addition, the phenomenon of ‘mission creep’, meaning “an inclination to define problems that require an increasing number of action alternatives that are technocratically impartial”, is a logical consequence of how international bureaucracies function and further contributes to the overall process of institutional fragmentation.⁵²²

This brief assessment demonstrates that an overly simplistic approach to streamlining land policies into climate change policy frameworks is destined to fail. The integration of different policies, however, is a particularly difficult task, since a policy is not a unitary, isolated or disembodied phenomenon, but a series of decisions.⁵²³ The constituent elements of a policy are its object, meaning the characteristics of the problem and the related theories, as well as the involved actors and their norms, the resources and means available, and

520 Cf. BIERMANN et al.: *Architecture*, loc. cit., p. 21.

521 Cf. Casper VAN DER VEEN: *Cognitive Diversity among Corporate Managers: Organizational Positions as Surrogates for Corporate-Level Strategy Beliefs* (Paper submitted to the 27th SMS Annual International Conference October 14-17, 2007), p. 20. <http://www.dewit-meyer.nl/_userdata/paper%20cognitive%20diversity_070615.pdf>. See also: UNCCD 2010: *Land Day 2*, loc. cit., p. 3.

522 LINNÉR, loc. cit., p. 279.

523 Cf. Helen BRIASSOULIS: *Complex Environmental Problems and the Quest for Policy Integration*, in: Id. (ed.): *Policy Integration for Complex Environmental Problems. The Example of Mediterranean Desertification*. Aldershot 2005, p. 1-49, p. 21.

the instruments and implementation mechanisms.⁵²⁴ True policy integration therefore needs to overcome all apparent irreconcilability “through attaining an underlying unity of purpose”.⁵²⁵ As the analyses in the previous sections have shown, such ‘unity of purpose’ is rarely achieved in political practice and seldom translated into coherent action. However, despite the justified criticism that the United Nations often receive in regard to particular political and institutional shortcomings, much of this criticism can be traced back to the fact that member states often have diverging interests and do not fully meet their obligations.⁵²⁶ In this respect, the UNCCD as well as the UNFCCC are manifestations of the United Nations system as a whole, where developed and developing countries are frequently divided by a climate of subliminal distrust. Therefore, several attempts to bridge this divide have been made in both conventions accordingly. The Articles five and six of the UNCCD set out the respective obligations and liabilities of affected country Parties and developed country Parties.⁵²⁷ Likewise, the Article three of the UNFCCC refers to the principle of “common but different responsibilities and respective capabilities” to implement the convention.⁵²⁸ This notwithstanding, especially the Least Developed Countries (LDCs) repeatedly urged the developed countries to fulfill their financial commitments on ODA and their political obligations to reduce emissions under the UNFCCC and the Kyoto Protocol.⁵²⁹ In the case of the UNCCD, the notion of ‘affected’ and ‘non-affected’ country Parties further contributed to this perceived divide.⁵³⁰ Therefore, it should be continually emphasized that responsibilities and capabilities evolve over time, and that these principles are not a means of dividing countries into two fixed classes.⁵³¹

524 Cf. BRIASSOULIS, loc. cit., p. 21-22.

525 Ibid., p. 21.

526 Cf. UNCCD 2010: UNCCD Land Day 2: Towards a Holistic and Inclusive Post-2012 Climate Change Agreement, p. 2. Available at <<http://unccd.int/publicinfo/landday/2010/docs/LandDay2Report.pdf>>.

527 Cf. United Nations 1994, loc. cit., p. 7-8.

528 United Nations 1992, loc. cit., p. 4.

529 Cf. UNEP / African Ministerial Conference on the Environment (ACMEN) 2009: Key Messages to Ministers and Heads of State and Government on Africa’s Common Negotiating Position on Climate Change By African Group of Negotiators, p. 1-3. Available at <http://www.unep.org/roa/amcen/docs/AMCEN_Events/climatechange/2nd_TechMeeting/KeyMessages_EN.pdf>.

530 Cf. JIU 2009, loc. cit., p. 4.

531 Cf. Adrian MACEY: Climate Change: Governance Challenges for Copenhagen, in: Global Governance 15 (2009), p. 443-449, p. 445.

It is nonetheless obvious from the very nature of the United Nations system that the work of both conventions is highly affected by the political dynamics between different groups of Parties. The UNCCD, for instance, has been seen by many developed and developing country Parties as a politicized instrument even prior to its coming into force; on the negotiation side as well as institutionally.⁵³² On the negotiation side, the climate convention was negotiated based on sound scientific studies, while the UNCCD negotiators, despite some highly technical preliminaries that have been held during the 1970s and 1980s, struggled valiantly to find a common definition of desertification and to integrate decades of desertification research.⁵³³ Moreover, the initial refusal of the OECD countries to accept a financial mechanism comparable to that of the UNFCCC led to the establishment of the Global Mechanism, which has often been perceived as an interim solution and an impediment to the acquisition of funds.⁵³⁴ Institutionally, many countries in the developed world thus saw the UNCCD on a different level vis-à-vis climate change and allocated the responsibility for the UNCCD neither to their ministries for the environment nor to those for agriculture, but to their ministries of foreign affairs or corporation, which were “unlikely to see desertification as a priority issue”.⁵³⁵ In developing countries, however, the responsibility for the UNCCD has often been allocated to the ministries of the environment, which can be regarded as relatively weak compared to other institutions dealing for instance with economic development.⁵³⁶ In the case of the UNFCCC, the issue of politization has also been an important factor in the work of the convention, as domestic and international responses to climate change are likely to involve higher political stakes than in the case of any other MEA.⁵³⁷ Effective climate change policies are expected to have comparatively drastic consequences on established economic and social structures as well as on economic growth, because they fundamentally “challenge the mode of economic and social development that has been pursued ever since the industrial revolution”.⁵³⁸

532 Cf. Author’s interview at the UNCCD Secretariat, Bonn, May 2010.

533 Cf. *ibid.* See also: KJELLÉN, *loc. cit.*, p. 128.

534 Cf. KJELLÉN, *loc. cit.*, p. 130.

535 JIU 2005, *loc. cit.*, p. 2. See also: Author’s interview at the UNCCD Secretariat, Bonn, May 2010.

536 Cf. JIU 2005, *loc. cit.*, p. 2.

537 Cf. Per-Olof BUSCH: The Climate Secretariat: Making a Living in a Straitjacket, in: Frank BIERMANN / Bernd SIEBENHÜNER (eds.): *Managers of Global Change: The Influence of International Environmental Bureaucracies*. Massachusetts Institute of Technology 2009, p. 245-264, p. 252.

538 BUSCH, *loc. cit.*, p. 252.

In addition, deep lines of division and conflict between Parties over the distribution of resources frequently led to fundamental, in some cases even insuperable, differences in national interests, which disposed all Parties to proceed very cautiously during negotiations.⁵³⁹ Hence, a prerequisite to pave the way for synergistic implementation and the meaningful inclusion of land issues into climate change policy frameworks is to foster constructive dialogue that could strengthen the post-2012 agreement on climate change.⁵⁴⁰ To this end, and in order to heighten the attention of policy and decision makers to the importance of land issues in the ongoing climate change negotiations, addressing desertification needs to be “reframed into a win-win strategy” for the benefit of all Parties involved.⁵⁴¹ Currently, various fora in the United Nations system are concerned with the challenging task to identify and utilize synergies, achieve greater policy coherence and overcome fragmented institutional arrangements. Most notably, the report of the *High-level Panel on United Nations System-wide Coherence*, entitled ‘Delivering as One’, stresses the need to overcome the fragmentation of the United Nations system as a whole, foster partnerships and serve the needs of all countries in their efforts to achieve the MDGs and other internationally agreed development goals.⁵⁴² In addition, the *Joint Inspection Unit*, as the only independent external oversight body of the United Nations system, is mandated to conduct evaluations, inspections and system-wide investigations.⁵⁴³ Regarding the Rio conventions, a *Joint Liaison Group* (JLG) has been established in 2001 to facilitate cooperation, enhance coordination and identify possible areas of joint activities.⁵⁴⁴ Moreover, several other institutions in the United Nations system are aiming to achieve greater policy coherence and system-wide responses to pressing issues of global concern. The *United Nations System Chief Executives Board for Coordination* (CEB),

539 Cf. BUSCH, loc. cit., p. 253. See also: Jing HUANG: A Leadership of 20 (L20) Within the UNFCCC: Establishing a Legitimate and Effective Regime to Improve Our Climate System, in: *Global Governance* 15 (2009), p. 435-441, p. 435-437.

540 Cf. UNCCD 2010: Land Day 2, loc. cit., p. 1.

541 JIU 2009, loc. cit., p. 4. See also: UNCCD 2010: Land Day 2, loc. cit., p. 1.

542 Cf. United Nations 2006: Report of the United Nations Secretary-General’s High-level Panel on UN System-wide Coherence in the Areas of Development, Humanitarian Assistance, and the Environment: Delivering as One, p. 1. Available at <http://www.undg.org/archive_docs/9021-High_Level_Panel_Report.pdf>.

543 Cf. United Nations Joint Inspection Unit (JIU) 2004: Welcome to the JIU, in: <<http://www.unjiu.org/en/index.htm>> (31.03.2011), n. p.

544 Cf. Steffen BAUER / Lindsay C. STRINGER: Science and policy in the global governance of desertification. An analysis of institutional interplay under the United Nations Convention to Combat Desertification (Global Governance Working Paper No 35). Amsterdam et al. 2008, p. 7.

under the leadership of the Secretary-General of the United Nations, has initiated a “process of aligning its strengths to achieve a coordinated action-oriented approach” to climate change.⁵⁴⁵ In response to the calls by governments for a “coherent United Nations system-wide contribution to land challenges”, the UNEP Environmental Management Group furthermore established the *Issue Management Group on Land* (IMG) in September 2009.⁵⁴⁶ For a period of two years, the IMG is tasked to propose options for the implementation of The Strategy and prepare a United Nations system-wide rapid response report on drylands, emphasizing “the importance of drylands to key emerging issues on the global agenda, including climate change, food security and human settlements together with options for follow-up action”.⁵⁴⁷ In view of the necessity to involve members of national parliaments in the UNCCD process, the *Parliamentarian Round Tables* have become a useful forum for exchange and interaction between parliamentarians on issues such as sustainable development and DLDD.⁵⁴⁸ Similar meetings of international parliamentarians and policy experts are also held to address climate change. Examples include the Pan-African Parliamentarian Network on Climate Change and the European Parliament Temporary Committee on Climate Change.

Despite these efforts, however, a lack of coordination and coherence has held back the full potential of the Rio conventions so far. None of the arrangements that have been made to promote synergies and joint decision making, including the *Joint Liaison Group*, are known to have led to significant progress on the ground.⁵⁴⁹ At the same time, overarching frameworks, such as the UNEP or international (environmental) law, have not been able to produce regulation to incite relevant institutions to systematically exploit potential

545 United Nations Chief Executives Board for Coordination 2008: Acting on Climate Change: The UN System Delivering as One, p. 3. Available at <<http://www.un.org/climatechange/pdfs/Acting%20on%20Climate%20Change.pdf>>.

546 Environmental Management Group (n. d.): Land, in: <<http://www.unemg.org/Cooperation/MultilateralEnvironmentAgreements/Land/tabid/1196/language/en-US/Default.aspx>> (31.03.2011), n. p.

547 UNEP 2010: Report of the first meeting of the Issue Management Group on Land (EMG/IMGland-1/02), p. 1.

548 Cf. UNCCD (n. d.): Parliaments in action, in: <<http://www.unccd.int/parliament/menu.php>> (31.03.2011), n. p.

549 Cf. BAUER / STRINGER: Science and policy, loc. cit., p. 8. See also: Sebastian OBERTHÜR: Interplay management: enhancing environmental policy integration among international institutions, in: International Environmental Agreements 9 (2009), p. 371-391, p. 381. Available at <<http://www.springerlink.com/content/a515m3x664t87119/fulltext.pdf>>.

for synergistic interaction.⁵⁵⁰ As a consequence, these shortcomings are reflected in academic literature. The few assessments that employ a synergistic approach are either vague in their content or outdated due to recent policy developments in the international climate change, biodiversity and desertification negotiations.⁵⁵¹ Linked to this is the fact that literature concerned with synergies between the Rio conventions often either focuses on specific governance issues or only on some of the three conventions.⁵⁵² In cases where the wider systemic context of the Rio conventions is addressed, for instance in assessments of compliance and enforcement mechanisms or studies on interplay management and environmental governance reform, the specific institutional arrangements of the conventions are mostly described in a rather superficial manner.⁵⁵³ As with institutional approaches to achieving synergy, recent suggestions range from forming a 'World Environment Organization' to 'clustering' or merging the Rio conventions.⁵⁵⁴ At present, however, these rather radical ideas are likely to hit a dead end due to a variety of political and legal

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- 550 Cf. Harro VAN ASSELT: Dealing with the Fragmentation of Global Climate Governance. Legal and Political Approaches in Interplay Management (Global Governance Working Paper No 30). Amsterdam et al. 2007, p. 16-17. See also: OBERTHÜR, loc. cit., p. 383.
- 551 Cf. OECD 2002: The DAC Guidelines. Integrating the Rio Conventions into Development Co-operation, p. 42-45. See also: IISD 2003: UNFCCC Workshops on Synergies and Cooperation with other Conventions: 2-4 July 2003. Earth Negotiations Bulletin 12 (2003) 22, p. 5; and: Annette COWIE / Uwe A. SCHNEIDER / Luca MONTANARELLA: Potential synergies between existing multilateral environmental agreements in the implementation of land use, land-use change and forestry activities, in: Environmental Science and Policy 10 (2007), p. 335-352, p. 349.
- 552 *See, for instance:* Frédéric JAQUEMONT / Alejandro CAPARRÓS: The Convention on Biological Diversity and the Climate Convention 10 Years After Rio: Towards a Synergy of the Two Regimes?, in: RECIEL 2 (2002), p. 169-180, p. 169.
- 553 Cf. Frank BIERMANN / Bernd SIEBENHÜNER: The Role and Relevance of International Bureaucracies: Setting the Stage, in: Id. (eds.): Managers of Global Change: The Influence of International Environmental Bureaucracies. Massachusetts Institute of Technology 2009, p. 1-14, p. 1-3.
- 554 Cf. RECHKEMMER, loc. cit., p. 38-39. See also: Konrad VON MOLTKE: On clustering international environmental agreements, in: Gerd WINTER (ed.): Multilevel Governance of Global Environmental Change. Perspectives from Science, Sociology and the Law. Cambridge 2006, p. 409-429, p. 429.

concerns.⁵⁵⁵ Regarding the political as well as the scientific debate, ecosystem services therefore present an ideal link to (a) create an underlying ‘unity of purpose’ in order to utilize synergies on an institutional and policy level, (b) establish a clear connection between the political, socio-economic and biophysical aspects of land, soil and climate change, (c) emphasize the interconnectedness of these issue areas, and (d) foster meaningful dialogue on the basis of a ‘win-win’ situation for all Parties. A few examples will serve to illustrate these points.

During the Land Day 2 meeting, held on 5 June 2010 in Bonn, Germany, UNFCCC deputy secretary Mr. Richard KINLEY explicitly emphasized that “land is the bridge between climate change adaptation and mitigation [...] [and] synergy is attainable in adaptation, mitigation and food security”.⁵⁵⁶ He also pointed out that there is potential for collaboration in the implementation of the *Nairobi Work Programme*, enhanced adaptation, financing, and the ‘nationally appropriate mitigation actions’ (NAMAs).⁵⁵⁷ In addition, four policy areas have been given special consideration during the first meeting of the IMG on Land, which took place from 24-25 November 2009 in Bonn:

555 Cf. Steinar ANDRESEN / Kristin ROSENDAL: The role of the United Nations Environment Programme in the coordination of multilateral environmental agreements, in: Frank BIERMANN / Bernd SIEBENHÜNER / Anna SCHREYÖGG (eds.): *International Organizations in Global Environmental Governance*. New York 2009, p. 133-150, p. 133. See also: Walker YOUNG: *Rio Conventions Redux: An Argument for Merging the Trio into a Single Convention on Environmental Management*, in: *Consilience: The Journal of Sustainable Development* 4 (2010) 1, p. 134-154, p. 147-148.

556 UNCCD 2010: UNCCD Land Day 2, loc. cit., p. 2-3.

557 “*The Nairobi work programme is a 5 year programme (2005-2010) implemented by Parties, intergovernmental and non-governmental organizations, the private sector, communities and other stakeholders. Its objective is to assist all Parties, in particular developing countries, including the least developed countries and small island developing States to improve their understanding and assessment of impacts, vulnerability and adaptation to climate change [...] [and] make informed decisions on practical adaptation actions and measures.*” See: UNFCCC (n. d.): *Nairobi work programme on impacts, vulnerability and adaptation to climate change*, in: <http://unfccc.int/adaptation/nairobi_work_programme/items/3633.php> (31.03.2011), n. p. *Nationally Appropriate Mitigation Actions (NAMAs) are related to the ‘Bali Action Plan’, launched as a comprehensive process to enable the full, effective and sustained implementation of the UNFCCC through long-term cooperative action. The Bali Action Plan envisages, under clause 1(b)(ii), enhanced national and international action on mitigation of climate change, including, inter alia, consideration of NAMAs by developing country parties in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner.* See: UNFCCC (n. d.): *Government of India Submission to UNFCCC on Nationally Appropriate Mitigation Actions (NAMAs) by developing countries*, p. 1. Available at <http://unfccc.int/files/kyoto_protocol/application/pdf/india100209b.pdf>.

(a) rural poverty (in particular the achievement of the MDGs and the level of progress needed in dryland areas to lift the largest segment of the world's poor out of poverty); (b) food security and resource fragility (in particular better and more sustainable management of dryland resources, including land, water, nutrients and the enhancement of crop productivity); (c) climate change and soil carbon sequestration; and (d) human security (with particular emphasis on enhancing livelihoods to minimize causes of conflict and channeling resources into conflict management and response).⁵⁵⁸ In view of these priorities, ecosystem services provided by land and soil have the potential to serve as an important link to facilitate synergies between the security realm, sustainable development, and climate change adaptation and mitigation. M.J. METZGER et al. note that:

*Terrestrial ecosystems provide a number of vital services for people and society, such as biodiversity, food, fibre, water resources, carbon sequestration, and recreation. The future capability of ecosystems to provide these services is determined by changes in socio-economic characteristics, land use, biodiversity, atmospheric composition and climate.*⁵⁵⁹

While the direct link between human well-being, climate change and the persistent loss of ecosystem services may seem an obvious one, an 'ecosystem service approach' to DLDD would also aim to preserve and enhance the capacity of a given ecosystem to produce a diverse array of goods and services over time, allowing for sustainable production of crops and other commodities, and therefore creating diversified livelihood opportunities for communities affected by DLDD.⁵⁶⁰ Consequently, an ecosystem service approach integrates political and socio-economic information with environmental data and is therefore in line with 'recent' theoretical advances.⁵⁶¹ However, given the fact that the idea of such an approach has been developed by economists in the 1950s (some scholars even trace it back to Plato) and the number of pub-

558 Cf. UNCCD 2010: Land Day 2, loc. cit., p. 2.

559 M.J. METZGER et al.: The vulnerability of ecosystem services to land use change, in: Agriculture, Ecosystems and Environment 114 (2006), p. 69-85, p. 69. Available at <http://www.schroeter-patt.net/2006_Metzger_AEE%28114%2969.pdf>.

560 Cf. Robin P. WHITE / Dan TUNSTALL / Norbert HENNINGER: An Ecosystem Approach to Drylands: Building Support for New Development Policies (World Resource Institute Information Policy Brief No. 1). World Resource Institute 2002, p. 2.

561 Cf. *ibid.*, p. 5. See also: Michel M. VERSTRAETE / Robert J. SCHOLLES / Mark STAFFORD SMITH: Climate and desertification: looking at an old problem through new lenses, in: Frontiers in Ecology and the Environment 7 (2009) 8, p. 421-428, p. 421.

lications on the benefits of natural ecosystems to human societies increased considerably since the early 2000s, it remains to be asked why this inclusive concept has been replaced by a partisan approach to science and policy development for several decades.⁵⁶² A service-oriented approach to natural resource management could enhance formal and informal collaboration initiated by authorities and support legislation, institutional interaction, collaborative learning, and conflict resolution from the local through global scales.⁵⁶³ In this regard, an ecosystem service approach complements the concepts of ‘climate justice’ and the ‘rights-based approach’ to DLDD, which both refer to mechanisms that seek to link government accountability, transparency and responsiveness to both international human rights and environmental law, while integrating a process for public participation and providing empowerment to people in the combat against climate change and DLDD.⁵⁶⁴ Clearly, there are also strong linkages between terrestrial/dryland ecosystem services and climate change adaptation and mitigation. Climate change adaptation, in a few words, “boils down to land and water, while mitigation concerns carbon and energy”.⁵⁶⁵ Thus, ecosystem services provided by land and soil play a vital role in both areas of operation. According to the JLG of the Rio conventions, possible areas of cooperation include cooperation in the area of forest ecosystems, and between the *national biodiversity strategies and action plans* (NBSAPs) under the CBD, the *national action programmes* (NAPs) of the UNCCD, and the

562 Cf. Rudolf S. DE GROOT / Matthew A. WILSON / Roelof M.J. BOUMANS: A typology for the classification, description and valuation of ecosystem functions, goods and services, in: *Ecological Economics* 41 (2002) (Special Issue: The Dynamics and Value of Ecosystem Services: Integrating Economic and Ecological Perspectives), p. 393-408, p. 393-394. Available at <http://www.afordablefutures.net/uploads/3/5/8/5/3585210/degroot_et_al.pdf>. See also Gretchen C. DAILY et al.: Ecosystem services in decision making: time to deliver, in: *Frontiers in Ecology and the Environment* 7 (2009) 1, p. 21-28, p. 23. Available at <<http://www.esajournals.org/doi/pdf/10.1890/080025>>.

563 Cf. Carl FOLKE et al.: Adaptive Governance of Social-Ecological Systems, in: *Annual Review of Environment and Resources* 30 (2005), p. 441-473, p. 450.

564 Cf. UNCCD 2008: Human Rights and Desertification, Exploring the Complementarity of International Human Rights Law and the United Nations Convention to Combat Desertification (Desertification, Land Degradation and Drought Issue Paper no. 1), p. 5. Available at <<http://www.unccd.int/publicinfo/docs/HumanRightsandDesertification.pdf>>. See also: Michael MORTIMORE: Adapting to drought in the Sahel: lessons for climate change, in: *WIREs Climate Change* 1 (2010), p. 134-143, p. 135; and: David S.G. THOMAS / Chasca TWYMAN: Equity and justice in climate change adaptation amongst natural-resource-dependent societies, in: *Global Environmental Change* 15 (2005), p. 115-124, p. 121-122.

565 UNCCD 2010: Land Day 2, loc. cit., p. 5.

national adaptation programmes of action (NAPAs) of the UNFCCC.⁵⁶⁶ The JLG further notes that “[t]here are several challenges to realize synergy, although many of these could be countered through appropriate planning and the application of tools such as the ecosystem approach”.⁵⁶⁷

In the context of biodiversity conservation and ecosystem management, the concept of ‘the’ *ecosystem approach* has been endorsed by the second Conference of the Parties to the Convention on Biological Diversity in November 1995.⁵⁶⁸ According to the CBD, “the ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way”.⁵⁶⁹ The CBD’s ecosystem approach also emphasizes that decisions about ecosystem health and ecosystem services have to be looked at in a wider, political, social and economic context.⁵⁷⁰ Thus, natural scientists have to find ways of linking their insights about the way ecosystems work to broader understandings of how people benefit from nature’s services and what can be done to help sustain and improve human well-being.⁵⁷¹ Since humans and their cultural diversity form an integral part of ecosystems, it is acknowledged that local communities as well as interest groups have the right to be involved in decision-making processes and get a fair share of nature’s benefits (i.e. ‘ecosystem services’). Consequently, the ecosystem approach is based on the understanding that complex environmental problems cannot be solved by one group of actors only; solutions re-

566 Cf. JLG 2009: Forests. Climate Change, Biodiversity and Land Degradation, p. 2-4. Available at <http://www.unccd.int/publicinfo/factsheets/pdf/forest_eng.pdf>.

567 JLG (n. d.): Adaptation under the Frameworks of the CBD, the UNCCD and the UNFCCC, p. 11. Available at <http://unfccc.int/resource/docs/publications/adaptation_eng.pdf>.

568 Cf. Pierre L. IBISCH / Peter HOBSON / Alberto VEGA E.: Mutual Mainstreaming of Biodiversity Conservation and Human Development: Towards A More Radical Ecosystem Approach, in: Pierre L. IBISCH / Alberto VEGA E. / Thora Martina HERRMANN (eds.): Interdependence of Biodiversity and Development Under Global Change (CBD Technical Series No. 54). Montreal 2010 (second corrected edition), p. 15-34, p. 16.

569 Ibid.

570 Cf. Roy HAINES-YOUNG / Marion POTSCHIN: The links between biodiversity, ecosystem services and human well-being, in: David G. RAFFAELLI / Christopher L.J. FRID (eds.): Ecosystem Ecology. A New Synthesis (BES Ecological Reviews Series). Cambridge 2010, p. 110-139, p. 130.

571 Cf. *ibid.*

quire a dialogue between policy, science and society.⁵⁷² Yet the question that arises in this context is how different definitions of ‘ecosystems’ can be synthesized and better utilized for policy and management decisions.⁵⁷³ CHURIE KALLHAUGE and VAN WELL note that “[t]he essential problem with connecting land-use change and forestry with greenhouse gas emission reductions (the so called ‘sink link’) is not so much to what extent these are related, but to what extent the linkages can be used politically”.⁵⁷⁴ The same principle also applies for possible synergies that have been identified in the area of climate change adaptation. On a political level, however, the ecosystem approach offers additional benefits over the current notion of sustainable land management that features prominently on the negotiation agenda of the UNCCD. Both, the ecosystem approach and the notion of ecosystem services would be in line with The Strategy of the UNCCD as well as the respective mandates of the other Rio conventions and provide additional opportunities for the UNCCD to coherently place the multiple dimensions of DLDD on the international agenda, particularly in regard to the ongoing climate negotiations and a more unifying framework for sustainable development.⁵⁷⁵ Currently, the

572 Cf. Oran R. YOUNG: *The Institutional Dimensions of Environmental Change. Fit, Interplay, and Scale*. Massachusetts Institute of Technology 2002, p. vii. See also: Michel LOREAU: *From populations to ecosystems: theoretical foundations for a new ecological synthesis*. Princeton 2010, p. 268; and: Brett A. BRYAN / Agnès GRANDGIRARD / John R. WARD: *Quantifying and Exploring Strategic Regional Priorities for Managing Natural Capital and Ecosystem Services Given Multiple Stakeholder Perspectives*, in: *Ecosystems* 13 (2010), p. 539-555, p. 552-553.

573 Cf. Kurt JAX: *Can We Define Ecosystems? On the Confusion Between Definition and Description of Ecological Concepts*, in: *Acta Biotheoretica* 55 (2007) 4, p. 341-355, p. 342. See also: IBISCH / HOBSON / VEGA E., loc. cit., p. 18-19.

574 Angela CHURIE KALLHAUGE / Lisa VAN WELL: *Making the link: synergies in international regime governance*, in: Angela CHURIE KALLHAUGE / Gunnar SJÖSTED / Elisabeth CORELL (eds.): *Global challenges: furthering the multilateral process for sustainable development*. Sheffield 2005, p. 274-292, p. 283-284. See also: LINNÉR, loc. cit., p. 281.

575 *The CBD identified the ‘CBD ecosystem approach’ as a framework for activities contributing to the objectives of the three Rio conventions. Moreover, the second Strategic Objective of the UNCCD Strategy is “to improve the conditions of affected ecosystems”. The UNFCCC, in Article 4(d), emphasizes the goal to “[p]romote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems”.* See: United Nations 1992, loc. cit., p. 5; and: CBD 2004: *Options for Enhanced Cooperation among the Three Rio Conventions (UNEP/CBD/SBSTTA/10/INF/9)*, p. 5. Available at <<http://www.cbd.int/doc/meetings/sbstta/sbstta-10/information/sbstta-10-inf-09-en.pdf>>; IBISCH / HOBSON / VEGA E., loc. cit., p. 19 and 23.

UNEP as well as the CBD are working to raise the profile of the ecosystem approach in the ongoing climate negotiation process and emphasize the need to develop “policies and economic strategies that place ecosystems and the services they provide at the center of future economic development and climate change mitigation and adaptation efforts”.⁵⁷⁶ According to the UNEP, the multiple benefits of the ecosystem approach include: (a) enhanced climate regulation through re-balancing of the carbon cycle; (b) protection of essential ecosystem services including enhanced food and water security; (c) public health and societal well-being; (d) reduction of risks of further ecosystem degradation and subsequent societal disruption; (e) and a guarantee that the essential systems for life support on Earth are correctly valued, protected and managed.⁵⁷⁷ In addition, the *Third ad hoc intergovernmental and multi-stakeholder meeting on an intergovernmental science-policy platform on biodiversity and ecosystem services*, held from 7-11 June 2010 in Busan, Republic of Korea, agreed to establish an intergovernmental science policy platform for biodiversity and ecosystem services (IPBES).⁵⁷⁸ The *Busan accord* notes that “the science-policy interface on biodiversity and ecosystem services must be strengthened at all levels” and underscores the importance to “enhance cooperation with relevant UN bodies and build capacity to mainstream biodiversity and ecosystem services”.⁵⁷⁹ Currently, the UNEP, UNDP, UNESCO and FAO are involved in the establishment of the IPBES.⁵⁸⁰

Moreover, the UNFCCC Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) makes several references to terrestrial and other ecosystems in the text of the *Cancún Agreements*.⁵⁸¹ The Cancún Agreements substantially built on the text of the Copenhagen Accord

576 UNEP 2009: Ecosystem management: part of the climate change solution (UNEP Research Brief), p. 5. Available at <<http://www.macaulay.ac.uk/copenhagen/documents/UNEP-CC-EM-5-page-brief.pdf>>. See also: IBISCH / HOBSON / VEGA E., loc. cit., p. 18.

577 Cf. UNEP 2009: Ecosystem management, loc. cit., p. 5.

578 Cf. UNEP 2010: Third ad hoc intergovernmental and multi-stakeholder meeting on an intergovernmental science-policy platform on biodiversity and ecosystem services (UNEP/IPBES/3/L.2/Rev.1), p. 2-4. Available at <<http://www.ipbes.net/meetings/Documents/ipbes3/K030396-IPBES-3-L.2Rev1.pdf>>.

579 UNEP 2010: Ecosystem services, loc. cit., p. 2.

580 Cf. *ibid.*, p. 5.

581 Cf. UNFCCC 2011: Report of the Conference of the Parties on its sixteenth session, held in Cancún from 29 November to 10 December 2010 (FCCC/CP/2010/7/Add.1). Addendum. Part Two: Action taken by the Conference of the Parties at its sixteenth session, p. 4, 5, 26 and 27. Available at <<http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2>>.

(FCCC/CP/2009/11/Add.1) by integrating the essential components of the Accord into the framework of the UNFCCC and thereby giving international policy makers more leeway to enhance action on mitigation, adaptation, technology development and transfer as well as capacity-building.⁵⁸² In addition, the Cancún Agreements create a framework for reducing emissions from deforestation and forest degradation in developing countries, the conservation and sustainable management of forests, and the enhancement of forest carbon stocks (REDD+).⁵⁸³ As previous analyses have shown, synergies between the Rio conventions and other actors are clearly attainable in these issue areas.⁵⁸⁴

However, while there is little doubt that the Cancún Agreements move the overall negotiation process forward, several observers and negotiators continue to express disappointment over certain aspects of the Cancún result.⁵⁸⁵ Especially in regard to the operationalization of the REDD+ framework, it has been acknowledged by several actors that there are still “concerns that need to be resolved if REDD+ is to make an impact across Africa and elsewhere in the developing world”.⁵⁸⁶ The successful implementation of REDD+ not only demands convincing mechanisms for the full and effective participation of relevant stakeholders, such as indigenous peoples and local communities, but also requires strong safeguards that will ensure the evaluation of environmental and social issues in decision-making processes.⁵⁸⁷ Moreover, a key block of developing countries such as Brazil, South Africa, India and China (BASIC), are unlikely to see the Cancún Agreements as a viable substitute for

582 Cf. United Nations Economic Commission for Africa 2011, loc. cit., p. 1.

583 *Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create a financial value for the carbon stored in forests. ‘REDD+’ goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.* See: United Nations REDD-Programme 2009: About REDD+, in: <<http://www.un-redd.org/AboutREDD/tabid/582/language/en-US/Default.aspx>> (31.03.2011), n. p.

584 Cf. UNCCD 2010: Land Day 2, loc. cit., p. 2-3.

585 Cf. Antonio G.M. LA VINA / Lawrence ANG / Joanne DULCE: The Cancún Agreements: Do they advance global cooperation on climate change? Foundation for International Environmental Law and Development 2011, p. 16. Available at <http://www.field.org.uk/files/the_cancun_agreements__lavina_ang_dulce_0.pdf>.

586 United Nations Economic Commission for Africa 2011, loc. cit., p. 6.

587 Cf. United Nations REDD-Programme 2011: UN REDD-Programme Newsletter No. 16, February 2011, in: <http://www.un-redd.org/Newsletter16/UNREDD_at_Forests_2011/tabid/51391/Default.aspx> (31.03.2011), n. p. See also: United Nations Economic Commission for Africa 2011, loc. cit., p. 6.

the *Bali Road Map*.⁵⁸⁸ In a joint statement, the respective country representatives stressed that the agenda of the AWG-LCA, in particular, should more closely follow the structure of the Bali Road Map.⁵⁸⁹ Technically, the Bali Road Map includes the so-called “Bali Action Plan” for long-term cooperative action under the convention, which centers on the thematic “building blocks” of adaptation, mitigation, technology, and financing – as well as land use, land-use change and forestry (LULUCF).⁵⁹⁰ However, even prior to the adoption of the Bali Action Plan in 2007, the element of LULUCF was regarded by Annex I countries as a relatively cost-effective way to achieve their emission reduction commitments under the Kyoto Protocol through soil carbon sequestration. Thus, the political initiative to highlight land issues and the agricultural sector has principally been put forward by two groups of countries: those for which the sector is economically dominant and those which, as in the case of LULUCF, are seeking out mitigation options that could deliver immediate results.⁵⁹¹ Under the AWG-LCA, these particular interests led to negotiations on the establishment of a work programme that would encourage cooperative development, transfer of technologies, and measures that may enhance the mitigation and adaptation potential of agricultural systems.⁵⁹² A draft decision to this effect was near completion in Copenhagen when action was shifted from the AWG-LCA by the last-minute introduction of the text for the Copenhagen Accord.⁵⁹³ Unfortunately, only little progress has been made in Cancún regarding the LULUCF sector, as developed and developing countries remain divided over the so-called “logging loophole”, which has stalled

588 Cf. Ministry of Foreign Affairs of the People’s Republic of China 2011: Joint Statement Issued at the Conclusion of the Sixth Basic Ministerial Meeting on Climate Change, New Delhi India, 26-27 February 2011, in: <<http://www.fmprc.gov.cn/eng/wjb/zwjg/zwbdt802845.htm>> (31.03.2011), n. p. *After the 2007 United Nations Climate Change Conference in Bali, Indonesia, the UNFCCC COP13 launched a comprehensive process (Bali Road Map) to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012.*

589 Ibid., n. p.

590 UNDP 2008: The Bali Road Map: Key Issues Under Negotiation, p. 7. Available at <http://www.undp.org/climatechange/docs/English/Bali_Road_Map_Key_Issues_Under_Negotiation.pdf>.

591 Cf. UNCCD 2010: UNCCD News (Issue 2.1, January-February 2010), p. 5. Available at <<http://newsbox.unccd.int/2.1/img/UNCCDNews2,1LR72a.pdf>>.

592 Cf. *ibid.*

593 Cf. *ibid.*

negotiations for years and might let developing countries increase their logging emissions without accounting for the greenhouse gases that result.⁵⁹⁴

Since the inclusion of the aforementioned building blocks in the Bali Action Plan, however, the UNCCD has been mainly focusing on mitigation and the carbon contained in soils in order to bring resources to affected developing countries.⁵⁹⁵ Keeping in mind the limited economic success of these efforts, placing a clear focus on the services provided by drylands and other terrestrial ecosystems may therefore offer additional opportunities to raise the profile of a synergistic approach to land issues that are also being addressed by the FAO, the IFAD and several other actors in the context of the Bali Action Plan and under the AWG-KP negotiation track.⁵⁹⁶ In addition, an ecosystem approach may provide new opportunities to foster interdisciplinary exchange among the scientific subsidiary bodies to the Rio conventions and place dryland issues high on the international research agenda, particularly in the areas of enhanced climate change adaptation, monitoring and assessment, networking and knowledge-sharing as well as cross-sectoral capacity building.⁵⁹⁷ Apart from the ongoing climate negotiations, however, a more pronounced ecosystem approach to drylands might offer new incentives for other United Nations bodies, business companies, civil society and scientists of various fields – including climate researchers, conservation biologists and economists – to “seek increased engagement with the UNCCD” and develop innovative policy strategies based on (eco-)system science.⁵⁹⁸ Furthermore, an ecosystem approach to drylands could encourage investment in the private sector, notably

594 Cf. Stacy FELDMAN: Logging Loophole Under Attack at Cancún Climate Talks (Reuters, 1 December 2010), in <<http://www.reuters.com/article/2010/12/01/idUS368348002620101201>> (31.03.2011), n. p.

595 Cf. Author’s interview at the UNCCD Secretariat, Bonn, May 2010.

596 Cf. FAO 2010: Towards a work programme on agriculture: a submission by the Food and Agriculture Organization of the United Nations, p. 2. Available at <<http://unfccc.int/resource/docs/2010/smsn/igo/081.pdf>>. See also: Author’s interview at the UNCCD Secretariat, Bonn, May 2010.

597 Cf. UNCCD 2009: Land Matters. Enhancing Synergies among the Rio Conventions on Land Use and Sustainable Land Management (UNCCD science briefs series no. 1). See also: E.M. BENNETT et al.: Why global scenarios need ecology, in: *Frontiers in Ecology and the Environment* 1 (2003) 6, p. 322-329, p. 327-328; and: VERSTRAETE / SCHOLLES / STAFFORD SMITH, loc. cit., p. 427.

598 BAUER / STRINGER: Science and policy, loc. cit., p. 8. See also: IBISCH / HOBSON / VEGA E., loc. cit., p. 19.

by means of public-private partnerships, and thus contribute to human well-being and the economic development of dryland regions.⁵⁹⁹ Given these emerging opportunities, the economic dimension of ecosystem services will be briefly discussed in the subsequent section.

4.2.2 Ecosystem Economics

Considering the economic dimension of ecosystem services, the Millennium Ecosystem Assessment provides one of the most influential concepts of categorization. From the publication of the MEA onwards, economic and policy research on ecosystem services has increased remarkably worldwide.⁶⁰⁰ In addition, the *Stern Review on the Economics of Climate Change*, although not the first economic report on climate change, has played a major role in shaping the recent debate.⁶⁰¹ At present, a growing number of scholars and practitioners are becoming aware of the need to understand complex ecosystems in their economic context, provide incentives that promote the sustainable use of natural resources and internalize the costs of environmental protection. Notably, the ongoing Economics of Ecosystems and Biodiversity (TEEB) project is making a strong case for ecosystem conservation by estimating the benefits of

599 Cf. Jeffrey C. Milder / Sara J. Scherr / Carina Bracer: Trends and Future Potential of Payment for Ecosystem Services to Alleviate Rural Poverty in Developing Countries, in: *Ecology and Society* 15 (2010) 2, (19 pp), p. 13-15. Available at <<http://www.ecologyandsociety.org/vol15/iss2/art4/>>. See also: UNEP (n. d.): Pro-poor Markets for Ecosystem Services, in: <http://www.unep.org/dec/support/Cross_Cutting/Pro_poor_markets.asp> (31.03.2011), n. p.

600 Cf. Brendan Fisher / R. Kerry Turner / Paul Morling: Defining and classifying ecosystem services for decision making, in: *Ecological Economics* 68 (2009), p. 643-653, p. 651. Available at <http://130.251.147.253/ecoamb/classification_ecosystem_services%202009.pdf>. See also: Rudolf S. de Groot et al.: Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making, in: *Ecological Complexity* 7 (2010) 3, p. 260-272, p. 260.

601 Cf. Terry Barker: The Economics of Avoiding Dangerous Climate Change (Tyndall Centre for Climate Change Research Working Paper 117). Norwich 2008, p. 2. Available at <<http://www.tyndall.ac.uk/sites/default/files/wp117.pdf>>. See also: Richard S.J. Tol / Gary W. Yohe: The Stern Review: A Deconstruction, in: *Energy Policy* 37 (2009) 3, p. 1032-1040, p. 1032-1033; and: Tariq Banuri / Hans Opschoor: Climate Change and Sustainable Development (DESA Working Paper No. 56). DESA 2007, p. 11. Available at <http://www.un.org/esa/desa/papers/2007/wp56_2007.pdf>; as well as: Nicolas Stern et al.: *The Economics of Climate Change: The Stern Review*. London 2006.

ecosystems for human well-being and the economic costs related to ecosystem degradation.⁶⁰² A similar project concerned with the economics of DLDD is currently being executed under the auspices of the International Food Policy Research Institute (IFPRI).⁶⁰³ The project is expected to be finalized in November 2011.⁶⁰⁴ Moreover, efforts to establish an Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) are in their closing stages.⁶⁰⁵ IPBES would create capacity to evaluate both progress towards biodiversity targets and the costs of falling short. However, with a view to the ongoing UNEP Green Economy Initiative, the recent launch of the *Decade for Deserts and the Fight Against Desertification* (2010-2020) and the upcoming Rio +20 conference in 2012, considerable momentum exists to put in place a more structured sequence of measures for the synergistic management of ecosystem change.

As of today, there is a growing interest in mainly two aspects related to the economic dimension of ecosystem services. The first aspect concerns the problem of finding a balance between private and public goods, which basically means “balancing economic aspirations with ecological imperatives”.⁶⁰⁶ In this regard, Garrett HARDIN’s argumentation about the ‘tragedy of the commons’ is still worthy of consideration.⁶⁰⁷ Hardin concludes that the problem of population growth “has no technical solution; it requires a fundamental extension in morality”.⁶⁰⁸ Larger population numbers will put additional pressure on ecosystems, intensify the competition for arable land, water and other

602 Cf. European Commission 2010: Ecosystem Services (Science for Environment Policy Special Issue 20), p. 1. Available at <<http://ec.europa.eu/environment/integration/research/newsalert/pdf/20si.pdf>>. See also: TEEB 2010: The Economics of Ecosystems and Biodiversity Report for Business (Executive Summary 2010). Available at <<http://www.teebweb.org>>.

603 Cf. UNCCD / GIZ / BMZ 2011: Measuring the value of land. The Economics of Desertification, Land Degradation and Drought, p. 4. Available at <<http://www.unccd.int/knowledge/docs/ATT4J7FE.pdf>>.

604 Cf. FISA Information System for Agriculture and Food Research (n. d.): The Economics of Desertification, Land Degradation and Drought: Towards an integrated global assessment of DLDD, in: <http://www.fisaonline.de/index.php?act=projects&view=details&p_id=3645&lang=en> (31.03.2011), n. p.

605 Cf. C. PERRINGS et al.: Ecosystem Services for 2020, in: *Science* 330 (2010), p. 323-324, p. 324.

606 Ernst VON WEIZSÄCKER et al.: *Factor 5. Transforming the Global Economy Through 80% Improvements in Resource Productivity*. London 2009, p. 4.

607 Cf. Garrett HARDIN: The Tragedy of the Commons, in: *Science* 162 (1968), p. 1243-1248.

608 HARDIN, loc. cit., p. 1243.

natural resources, and increase the total demand for energy. Concerted action on environmental challenges thus requires the current generation to make fundamental decisions about the use of different types of advanced technology, the ethical dimension of governance and the distribution of knowledge, resources and wealth.⁶⁰⁹ Despite the considerable forces in support of rigid adherence to the status quo, it follows that economic models need to be reformulated, focus on the long-term consequences of resource depletion and capture the real value of nature to society.⁶¹⁰ Ethical values also need to emanate from binding policies and must be put into practice at the global to local levels. Since the main priority of most developing countries, particularly in Africa, is still poverty reduction and economic growth, ecosystem market mechanisms need to be integrated in national development strategies and accustomed to multiple levels of governance. Moreover, they need to be developed with the involvement of all relevant stakeholders in order to guarantee an equitable distribution of revenues.

Placing an economic value on particular ecosystem services, however, is no simple task. In order to incorporate ecosystem services into policy-making, it is necessary to classify different types of services that allow for meaningful comparisons across space and time.⁶¹¹ Nevertheless, ecosystem processes or functions only become services if people benefit from them.⁶¹² Therefore, one way to value ecosystem services would be to use their 'spatial' characteristics and include categories that describe particular relationships between service production and areas where the benefits are realized.⁶¹³ At the same time, it should be borne in mind that decisions about the use of ecosystem services are made in specific social or political contexts.⁶¹⁴ Hence, current research suggests considering these specific circumstances as well as the characteristics of different ecosystems when deciding which classification system to use.⁶¹⁵ Yet it has to be taken into account that the implementation of particular MEA obligations by national governments is often constrained by limited resources and that prospective return on investments is an important factor affecting

609 Cf. Nicolas STERN: *The Global Deal: Climate Change and the Creation of a New Era of Progress and Prosperity*. New York 2009, p. 75.

610 Cf. UNCCD 2010: Notes for the opening session of the Land Day 2 conference of the UNCCD. Ian Johnson, p. 4 and 6. Available at <<http://www.unccd.int/publicinfo/landday/2010/docs/ianjohnson.pdf>>.

611 Cf. FISHER / TURNER / MORLING, loc. cit., p. 651.

612 Cf. *ibid.*, p. 649.

613 Cf. *ibid.*, p. 651.

614 Cf. European Commission 2010: *Ecosystem Services*, loc. cit., p. 3.

615 Cf. *ibid.*

investment decisions.⁶¹⁶ Nevertheless, as several reference projects clearly demonstrate, an ecosystem service approach could help to raise additional funds, strengthen economic ties with the private sector, combat environmental degradation and integrate investment in ecosystem services into national development strategies.⁶¹⁷ Especially with regard to the economic priorities of those countries most affected by DLDD and climate change, flexible investment in ecosystem service projects could help increase capital flows to the local level and allow investors to focus on wide range of financial sources such as REDD+, carbon markets, ecotourism fees and payments for the conservation of ecological systems and access to research areas.⁶¹⁸

Nonetheless, effective markets for ecosystem services directly depend on enabling public policy and regulatory frameworks on multiple scales. Potential synergies between business, conservation and poverty reduction are not realized automatically.⁶¹⁹ Thus, incentive- and market-based mechanisms need to be carefully devised and implemented in order to be grounded in social consensus and ownership and to avoid the exploitation of resources.⁶²⁰ Moreover, the implementation of ecosystem market mechanisms is expected to have high transaction costs.⁶²¹ Under the most favorable conditions, however, it is conceivable that as many as 600-800 million rural poor in developing countries could participate by 2030 and ecosystem service markets could benefit a high proportion of the two billion rural poor who live on less than

616 Cf. UNCCD 2009: Scientific Conference, loc. cit., p. 11.

617 *For further information on emerging market opportunities, see:* TEEB 2010, loc. cit., p. 11-12. See also: The Katoomba Group (n. d.): Ecosystem Market Place, in: <<http://www.ecosystemmarketplace.com/>> (31.03.2011), n. p.; and: Author's interview at the UNCCD Secretariat, Bonn, May 2010.

618 Cf. The Katoomba Group 2009: Ecosystem Market Place. PES in West Africa: An Online Resource for Students and Practitioners, in: <http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=7144§ion=news_articles&eod=1> (31.03.2011), n. p. See also: CBD 2010: Compilation of Experiences in the Field of Climate Change Mitigation and Adaptation, Soil Management and Pastoralism in Dry and Sub-Humid Lands (UNEP/CBD/SBSTTA/14/INF/35), p. 18.

619 Cf. United States Department of Agriculture (n. d.): Forest Service: Ecosystem Services FAQs, in: <http://www.fs.fed.us/ecosystems-services/About_ES/faq.shtml#fsinvolved> (31.03.2011), n. p.

620 Cf. Kathleen MCAFEE / Elizabeth N. SHAPIRO: Payments for Ecosystem Services in Mexico: Nature, Neoliberalism, Social Movements, and the State, in: *Annals of the Association of American Geographers* 100 (2010) 3, p. 1-21, p. 2.

621 Cf. The Katoomba Group 2009, loc. cit., n. p.

US \$2 a day.⁶²² This would represent annual payments to rural households and communities on the order of US \$20-30 billion per year.⁶²³

622 Cf. UNEP (n. d.): Pro-poor Markets for Ecosystem Services, loc. cit., n. p. See also: MILDER / SCHERR / BRACER, loc. cit., p. 13.

623 Cf. MILDER / SCHERR / BRACER, loc. cit., p. 13.

5 Conclusion and Policy Recommendations

The diverse impacts of climate change and DLDD clearly highlight the importance of policy coherence and interdisciplinary research in the UNCCD implementation process. The interdependent feedback loops between food insecurity, poverty, migration and conflict are not only reinforced by environmental degradation or a lack of adequate technologies and economic growth, but are often related to complex political problems about distribution, rights, and access to resources.⁶²⁴ Against this background, the results presented in this volume illustrate that an ecosystem approach offers multiple benefits and enables scholars, policy makers and local communities alike to address climate change and DLDD in the wider context of ecosystem thinking.⁶²⁵ However, despite the rugged dynamics of ‘realpolitik’ and strong practical arguments for an ecosystem service approach, it has to be kept in mind that nature is not a positive externality, but our native soil that will never be measurable in terms of money. It also has to be considered that environmental problems are not ‘out there’. They can and will not be solved without fundamentally changing the way we interact economically and as individuals. Thus, promises about ethical values that have been made in numerous speeches also need to emanate from binding policies and must be put into practice at the global to local levels. In this regard, strong economic incentives and a good sense of ‘realpolitik’ come into play again. Since the main priority of most developing countries, particularly in Africa, is still poverty reduction and economic growth, ecosystem market mechanisms need to be integrated in national development strategies, accustomed to multiple levels of governance, and developed with the involvement of all relevant stakeholders in order to guarantee an equitable distribution of revenues. The economic prospects of these markets, however, are bright. Nevertheless, ecosystem services are not a panacea for the world’s problems. They are only one tool amongst a variety of policy measures that need to be put in place in order to improve long-term environmental sustainability and the situation of those whose daily lives are directly affected by the impacts of DLDD and climate change. Cognizant of the political dispute between the climate skeptics and activist scientists, however, many people still refuse to perceive climate change and melting icecaps as a man-made thread. The logical fallacy behind this notion is that, in any case,

624 Cf. Sarah A. RADCLIFFE (ed.): *Environmentalist thinking and/in geography*, in: *Progress in Human Geography* 34 (2010) 1, p. 98-116, p. 104.

625 Cf. UNCCD 2010: Notes for the opening session of the Land Day 2, loc. cit., p. 7.

mankind will have to find new and more efficient ways to meet its resource demands and adapt to a changing climate. Increasingly dangerous weather patterns and a rapidly shrinking resource base are already a reality – whether these problems are seen as man-made or not.

It is also evident that in the years ahead the mixed effects of climate change are likely to be distributed along the fracture lines of inequality. Therefore, it is of paramount importance to strengthen the mitigative and adaptive capacity of dryland communities on a local to global scale. Since land and soil can be considered a ‘bridge’ between climate change adaptation and mitigation and strong functional linkages exist between biodiversity conservation and combating DLDD, the debate on maximizing positive synergies among the Rio conventions needs to be quickly followed by action. Clearly, sustainable land management and approaches such as payments for ecosystem services can play an important role in this regard.⁶²⁶ Nonetheless, the chronic investment gap facing the LDCs will necessitate scaling up development assistance along with the piloting of new and innovative sources of development financing.⁶²⁷ ODA disbursement, net of debt relief, even fell prior to the onset of the financial and economic crisis and continues to fall well short of the targets and commitments made by the international donor community. Given these circumstances, the financial pledges made at the 2009 G8 Summit in L’Aquila were certainly a promising step in the right direction and may be tapped in order to revitalize dryland development.⁶²⁸ Yet, additional resources will be needed.⁶²⁹ Particularly in Africa, much of the investment in value terms still remains concentrated in the primary and extractive sectors of a relatively limited group of countries. It will be a delicate balancing act for African governments to successfully manage trade liberalization, attract and yet regulate foreign direct investment, and achieve diversification of export and production. In this context, well-designed regulatory and institutional frameworks, strong anti-corruption measures and public-private partnerships in conjunction with investments in infrastructure and education play a critical role in creating an environment favourable to sustained economic growth and employment generation.

626 Cf. Bruno LOCATELLI: Local, global: integrating mitigation and adaptation (CIRAD Perspective no. 3) CIRAD Agricultural Research for Development 2010, p. 3-4.

627 Cf. UNCTAD 2010: Hungry for change: building new paths to food security in LDCs (UNCTAD Policy Brief No 15), p. 2. Available at <http://www.unctad.org/en/docs/pressPB20105_en.pdf>.

628 Cf. UNEP 2010: Report of the first meeting of the Issue Management Group on Land, loc. cit., p. 2.

629 Cf. UNCTAD 2010: Hungry for change, loc. cit., p. 2.

Against this background, the integration of ecosystem-based approaches into NAPs and national development strategies is an important factor to promote improved growth and trade prospects for the world's drylands.⁶³⁰ However, in order to respond to the environmental challenges facing smallholder farmers in dryland regions, 'pro-poor' investment options must be carefully evaluated and based on sound scientific assessments. As the policy and market analysis in section 4.1.3 has demonstrated, biofuel production, for instance, is likely to be an unsustainable and risky investment choice for small-scale producers. Modeling the future biodiversity balance for different crops on different land types has shown that GHG reductions from biofuel production would often not be enough to compensate for the biodiversity losses from increased land use conversion, not even within a time frame of several decades and through selected production standards. In addition, competing interests and changes to land tenure arrangements may lead to conflicts and small-scale farmers being increasingly dependent on loans, big companies, economies of scale and volatile markets.

Considering these aspects, it is of vital importance to strengthen the exceptionally weak role of the social sciences in the programmatic process of UNCCD implementation. In many cases, a natural science approach still prevails in the analysis of the interdependent feedback loops between processes that affect the state of land, soil and the climate system. In addition, policy research concerned with the Rio conventions often focuses on a very narrow part of particular governance architectures without engaging with the wider, systemic context. While this may be appropriate in some cases, further interdisciplinary dialogue is needed – ideally in a scientific conference format comparable to the successful Land Day 2 meeting – in order to carry the UNCCD message forward and build on existing synergies. Today, comprehensive studies of shifting demographics and governance structures in dryland regions are still rare. In addition, *ex-ante* policy analyses are seldom considered.⁶³¹ Instead, most studies mainly focus on *ex-post* assessments of past policy performance and do not conduct in-depth analyses of institutional frameworks or the economical feasibility of different policy options. As a consequence, the complex structures of multi-level governance and legislation often appear as simplistic cause/effect paradigms. In view of the dynamic feedbacks between local and global governance architectures, however, problems on both levels are increasingly connected. While the agency of the central state is fundamentally

630 Cf. UNCTAD 2010: Hungry for change, loc. cit., p. 2.

631 Cf. Insa THEESFELD et al.: Ex-Ante Policy Assessment From an Institutional Perspective: A Procedure for Institutional Compatibility Assessment (PICA) (ICAR Discussion Paper 20). ICAR 2008, p. 21.

challenged by processes of fragmentation, the effective implementation of MEAs demands strong national authorities and jurisdictions. Some also argue that a variety of services are better taken locally.⁶³² Parties to MEAs, on the other hand, need reliable institutions that provide guidelines, strategic vision and personal leadership. This fundamental conflict needs to be better understood and taken into account. Therefore, the UNCCD needs to take initiatives such as the long-neglected UNCCD fellowship program more seriously and strengthen an interdisciplinary research base responsive to users. While there will be additional costs involved in implementing these measures, the benefits of a collaborative relationship between different scientific communities will certainly extend beyond the academic realm, since the UNCCD is rooted in a very relevant socio-economic context and conveys a strong political message. The outreach of this message, however, is still limited. Therefore, high-quality research publications like the upcoming report on the economics of desertification, which should be freely available via the internet and clearly associated with the Convention, are important tools to raise public awareness about the importance of dryland issues. It is also recommended for the UNCCD to further strengthen its ties with civil society and 'think outside the political box'. In this regard, the *United Nations Messengers of Peace* campaign may serve as a good example. The UNCCD needs more 'Messengers of Desertification', meaning carefully selected individuals from the fields of art, literature, music and sports who are willing to carry the UNCCD message to broader audiences beyond the sphere of academia, 'handpicked' civil society organizations and political audiences. To this end, the recent launch of the *Decade for Deserts and the Fight Against Desertification* may serve as a viable communication vehicle between the UNCCD and society at large.

In conclusion, it may nevertheless be said that the UNCCD has the potential to become one of the most advanced MEAs of the 21st century, since it embodies the ideals that lie at the core of Agenda 21 like no other political instrument of its kind. In order to fully develop this potential, however, the Parties and the Secretariat need a long-term strategic vision and the political will to consequently turn a feature of the Convention that has often been perceived as a weakness into the greatest strength of the UNCCD: the focus on the environment and sustainable development. Only if integrated and system-based approaches are consequently communicated and clearly emanate from the decisions of the COP, the UNCCD will be perceived as what it actually is: the world's first truly integrated ecosystem convention.

632 Cf. Liesbet HOOGE / Gary MARKS: Unraveling the Central State, but How? Types of Multi-level Governance, in: *American Political Science Review* 97 (2003) 2, p. 233-243, p. 233 and 241.

6 Annex

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Interview Transcript

5 May 2010

UN Campus, Bonn

Interviewer: Karsten Schulz

Interview with Sergio Zelaya, Coordinator of the Policy Advocacy and Global Issues Unit (PAGI) of the UNCCD Secretariat

Karsten Schulz (KS):

Good morning Mr. Zelaya. First of all I would like to thank you for having me.

Sergio Zelaya (SZ):

Always a pleasure.

KS:

Now, my first question is: how do you perceive the role of the social sciences in the UNCCD process? Especially in regard to the view that the natural sciences predominate in programmatic and information sharing processes?

SZ:

I think that, from a theoretical point of view, social sciences should play a larger role in the programmatic process of UNCCD implementation. The nature of the text of the convention that was negotiated by Parties twenty years ago reflected the need to include the priority issues on the social and economic fronts that the countries had. And I think, even though the scenario has changed a lot since then, the priorities for the developing countries are still economic development: poverty reduction and economic growth. In addition, one of the objectives of the developed countries in the international community is to provide cooperation for the alleviation of poverty and for sustaining economic growth. So there is a coincidence among the developed and developing countries in regard to the long-term objective of human well-being. In

the convention, this is also included theoretically. In practice, it hasn't been like that. Now, the role of social science in these programmatic processes has been very weak in comparison to the natural sciences. Both of them have been weak. But the weakest is still the role of the social sciences.

KS:

My second question regards the dynamics between developed and developing countries, especially at COP meetings. From your point of view as a negotiator, do you think that there is a divide in the interests of those two country groups, or do you think that interest groups are rather related to issues than geographical location? Or is there a combination of both?

SZ:

A combination, yes. I think that the UNCCD as well as the other Rio conventions are a manifestation, a spillover of the United Nations system as a whole. There is a dialogue between developed and developing countries. And the structure of the United Nations, with the Security Council, the Economic and Social Council and the cooperation partners etc. reflects this idea. And, as I said, the UNCCD is also a reflection of this. This is one point. It is supported by the Articles 5 and 6 of the convention that indicate the obligations of affected country Parties and developed country Parties. So different responsibilities are given to different groupings of countries. The same can be said for the issue of climate change for example. There are the Articles 2 and 3 of the UNFCCC, where it is said that reduction of greenhouse gas emission concentrations should take place without causing damage to social and economic growth and the countries that have caused these emissions should be responsible. For them, this is the same principle. So, that is one side, the side of the United Nations. But there is another side, the side of the local, the national governments. In developing countries, and even in affected developing countries, DLDD is not a priority. This set of issues is yet to be a priority. For them, as said, the priority is economic growth and poverty reduction. Only if combating DLDD is perceived as helping to achieve poverty reduction and economic growth, it will be part of the package that they can submit to their own governments and to the cooperation partners. The same can be said about the developed country Parties. They don't have DLDD as a priority issue. There are other priority issues in their frameworks of cooperation and one can see very easily in an empirical study that on a country by country basis desertification is included at a very low priority level. So, none of these two groups have DLDD as a priority.

KS:

Ok, thank you. This directly leads to my third question. The question concerns the paper “Revitalizing the UNCCD”. In this paper it is said that the interest in DLDD issues has been relatively low among climate negotiators.

SZ:

I agree completely. But can I ask you one question before? What do you think about this paper?

KS:

Well, I think that some of the judgments that are made in this paper are relatively harsh, because there are different political dimensions that have to be taken into account. For instance the position of the Parties. One cannot simply say that UNCCD negotiation capacities or policies alone are responsible for this lack of interest. It must be clearly said that even the best negotiators can not shift a country’s priority just like that. Many developed countries also do not like to see themselves just in a donor role. They expect to get something back for their engagement. So I think this paper is ...

SZ:

Biased?

KS:

In a way.

SZ:

Well, I agree with your assessment. But let me add one thing on the issue of politicization. The instrument of the convention was politicized since the beginning. So many developed and developing Parties saw this instrument on a different level vis-à-vis climate change and biodiversity, because the UNFCCC and CBD were negotiated based on sound scientific studies. This convention, however, was more of a political manifestation or declaration. Even though there were highly technical preliminaries.

For instance in 1974 there was an international meeting on desertification and another one in the 1980s. In the 1990s, when the convention came to life, twenty years of research needed to be integrated. But it wasn't like that. So since the beginning, the convention has been seen as politicized. There is evidence for this, institutionally and on the negotiation side. Institutionally, in developing countries the convention is either negotiated by ministers of the environment, or by those of agriculture or foreign affairs. In the developed world, it is very easy to see that many countries have allocated the responsibility for this convention to their ministries of foreign affairs. The ministries of foreign affairs by their own nature are political instruments.

KS:

Of course, and not environmental.

SZ:

Not environmental, and not agricultural or energy-related like the ministries responsible for the other conventions. In Germany, for example, the ministry for the environment is responsible for the Convention on Biodiversity. The UNCCD is associated with the ministry for economic and development cooperation. Of course, these are different ministries by nature. This is the institutional side. On the negotiation side, since I was a negotiator in the 1990s, I reckon that the environmental community, in the developed as well as in the developing countries, came with their hands full to the conventions on biodiversity and on climate change. They didn't care much about if this convention was going under the ministries of foreign affairs, because they already had a vision for these huge issues to be dealt with in the biodiversity and climate change conventions. But now, the issue of DLDD has been gaining interest and gaining profile.

KS:

I have another question in this context. Was it also difficult for the UNCCD to initiate institutional cooperation because there is a focus on ecological issues on the one hand and on sustainable development on the other hand? Was that hard to combine?

SZ:

Yes, it was hard to combine and I think there was not enough clarity from the side of the Parties and the Secretariat that services the Parties. From the Secretariat and other bodies, like the Global Mechanism. Is this a sustainable development convention or an environmental convention? If you say sustainable development convention, you have to have the guidelines for sustainability that guide and influence the decisions and must emanate from them. But COP after COP, the issues of sustainable development and the environment are still mixed together and not very clear. So more guidance and vision is needed.

KS:

I see.

SZ:

So we need a more strategic vision. And the Executive Secretaries that we have had so far had their own vision. But regarding sustainable development and the environment, a vision has yet to be provided to the Parties.

KS:

A vision for combining both?

SZ:

Either combining, or going this way or the other way. But some sort of vision.

KS:

But by definition, one could say that the UNCCD is an environmental convention in regard to the Rio process as a whole. Do you think that has been prioritized or neither of it?

SZ:

Exactly, neither of it. So how can we articulate this issue in a way that can help the affected countries, mostly developing, to address their priority issues? As I said, those priorities are poverty and economic growth. So how can we say: we assist you in your strategic vision, policies or guidelines regarding poverty-reduction and economic growth, including sustainable development in dryland ecosystems, and in view of the livelihoods of the affected communities? This governance is something that is still needed. Raising the awareness for the need to have an institutional focus in developed and developing countries has to be continuously addressed and clearly addressed by the Executive Secretary, the Secretariat, and the bodies of the convention.

KS:

Thank you for these interesting insights. Now, there are some issues that have been identified in order to combine climate change and land issues. For instance sustainable land management and land rehabilitation. Do you think that these issues will be included more clearly in future climate agreements? Because right now, they are more or less incorporated in the issue of deforestation.

SZ:

Well, sustainable land management is included expressively in the decision 3 of COP 8 of the UNCCD, where it says "DLDD/sustainable land management". So what the Parties did on the one hand, in my interpretation, is that they identified the negative side, desertification, land degradation and drought, and the positive side, the forward-looking approach. On the other hand, the Bali meeting agreed upon the Bali Action Plan. This plan has building blocks and one of the building blocks is land and agriculture. So land is a building block of climate change adaptation and it is already included in the Bali Action Plan as part of long-term cooperation, action and shared vision.

KS:

And why do you think it has not been addressed that much recently?

SZ:

Well, in the last 20 years, since the convention on climate change appeared, for negotiators – and I was one, so I know exactly – the idea was to focus on greenhouse gas emissions. Of course there are other issues, like ecosystem resilience for instance. The terrestrial ecosystem, the marine ecosystem, the economic services provided by these ecosystems and social issues like gender, migration and so on. Now these issues were not specifically included, because the idea was to negotiate an instrument to address the ultimate goal of the UNFCCC: to reduce greenhouse gas emissions. So at that time it was a milestone to say: we have the climate convention and we have instruments to reduce greenhouse gas emissions under the Kyoto-Protocol. Then, in Bali, the inclusion of the building blocks was the second milestone. So, from Bali until today, it is only two and a half years. In these two and a half years, much has been done to include the terrestrial and other ecosystems into the negotiations.

The problem is that in Copenhagen, the final document to be negotiated was actually not negotiated and something else came up. Now, during the last two years and for financial purposes the UNCCD has been focusing much more on its linkages with mitigation and the carbon contained in soils, in order to bring resources to the affected developing countries. But this has yet to be seen and under the UNFCCC the negotiations on mitigation will go on. But also on adaptation there are policies and measures that are taken, so that we can be included into the negotiation process. I would like to mention that the last document that is on the website, about a shared vision on adaptation and forests, talks about sustainable land management. And this is because of the advocated approaches of this convention. Actually, I have been participating in many meetings throughout 2008 and 2009 in order to include in the negotiations at least sustainable development or rural development, agriculture, water and land etc. Of course the UNCCD can not claim the whole success, because other relevant actors, such as many country negotiators, the FAO, lots of NGOs, and institutions like IFAD are joining forces to achieve this. But we are a part of this and have been raising awareness among the focal points. Now, there are two more things I would like to mention on sustainable land management: on the conceptual side, for the functioning of an ecosystem, sustainable land management is a prerequisite. For instance, there is land degradation, a solution to land degradation is sustainable land management and these will address climate change. And in this way it should be advocated by the UNCCD. The second aspect is the population, the livelihoods, the human well-being. Whatever we do has to take into consideration the nature and the livelihoods of the people. That is what has been called hu-

man well-being. It is included in the rights that all humans have, today, and for future generations. These two long-term objectives can be achieved by concrete action on sustainable land management. Now, what is the prerequisite of sustainable land management? It is governance, empowerment, awareness, information at the local level. So we have to tackle those issues.

KS:

How do you think the UNCCD can strengthen the role of local governance?

SZ:

As an example, what we have been doing on this issue is choosing a rights-based approach, for instance regarding food security for the populations. In addition, we have the security approach. There is a natural expectation on what the land provides for you. And the government, the communities and the political as well as institutional environment have to enable people to produce on their land, give them the security, assurances and guarantees that they can use the land. Taking decisions from the bottom to the top is also important, as the text of this convention mentions. This is governance, the bottom-to-top approach. And I think this kind of governance is the obvious solution to DLDD.

KS:

So while the UNCCD is naturally an instrument of global governance, one could say that through this approach and by its own definition it is also an instrument of local governance?

SZ:

Yes, exactly. If we have global solutions on the one side and local solutions on the other, the convention has to advocate globally while being based on a solid local base and actions. Local solutions can help to achieve global solutions. It is an interaction. You used the word dynamics before. This is a dynamic system, and the nature of research in the social sciences is dynamics. I see different dimensions: first, create global awareness. This means training, retraining and all the derivatives like information, technology transfer, manuals, documents, materials etc. The second: act on the legal framework. How can this convention help to develop certain legal frameworks, for instance re-

garding anti-desertification and pro-sustainable land management? Not only at the national level. Large countries like Brazil and China must also act locally. Even an island needs action at the local level. The third one is the improvement of technology. This is different from education and training. It is learning by doing. How can we help people to achieve their goals on their own and with new technologies? Science is only the input. Science *per se* has no value. You can produce the best scientific result and put it in a closet. That helps no one. So we need scientific research as an input through which people can improve their own technologies. This is something that can be done and it would mean that research has not only to be done in the developed world, but also at the local level, with the local communities in developing countries. We need to provide the tools and improve the capabilities. Physical tools and also enabling tools, for instance infrastructure like roads and information services like radio or computers.

KS:

So as a whole, this approach is about policy, capacity building and physical tools?

SZ:

Yes, capacity building, instruments like policy, governance, infrastructure like roads to gain market access, and financial resources. This has to be considered initially. Just take the Marshall Plan for example. There was a lot of money initially. For the earthquake in Haiti, there are a lot of financial pledges initially. You can not expect affected countries to come all the way from the distant position in which they are now in comparison with other countries regarding human-well being, and come up with all of this by themselves. There are many constraints that they have. So financial resources are important, mostly at the beginning. And this convention has to ensure that some of these resources are allocated for desertification and sustainable land management.

KS:

And how do you think this could be achieved?

SZ:

Well, my belief is that if what is said about money follows a good idea is true, then this has to be put in practice. But you have to have credibility and you have to have a vision. If you have good idea and you don't have a long-term vision and your vision is not deducted from the demands of the local populations, it is just another idea put in a closet. So the idea has to be effective and it has to be borne by the people. You need empowerment. You can not say: "I have an idea and I am going to implant this idea for you!" The idea has to be their idea. This is ownership and for sure it has high transaction costs. The UNCCD has to be aware of these costs. For two decades the UNFCCC has been raising awareness and been investing money in climate change awareness. And I think that is what we need to do. Passing from knowledge to action.

KS:

Mr. Zelaya, I thank you very much for this interview.

SZ:

You are very welcome.

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