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Bioenergy from Dendromass for the Sustainable Development of Rural Areas: Research Findings from the AgroForNet and BEST Projects of the German 'Sustainable Land Management' Funding Programme

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1.1

The 'Sustainable Land Management' Funding Programme

In October 2008, the German Federal Ministry of Education and Research (*Bundesministerium für Bildung und Forschung*, BMBF) published a call for proposals under the heading 'Sustainable Land Management'. A component of the 'Research for Sustainable Development' (*Forschung für Nachhaltige Entwicklung*, FONA) framework programme, the 'Sustainable Land Management' funding programme targeted the initiation of inter- and transdisciplinary research groups with a national and an international focus. The motivation behind this initiative was the many challenges facing land use today and in the future: challenges in the context of climate, demographic and economic change. Regions of Germany and other parts of the world likely to be especially susceptible to the impacts of these changes require new perspectives and new adaptation strategies in order to adjust to the evolving, ever-increasing and multifaceted demands placed on land use.

The numerous stakeholders and their interests, and the many competing demands placed on the use of rural resources, call for comprehensive, integrated, and above all sustainable approaches (BMBF, 2008). Regions especially affected by climatic and/or structural-demographic changes were granted special consideration under the funding programme. To counter the challenges facing these regions in the realm of land management, the BMBF sought collaborative research projects transcending the boundaries between individual disciplines and actively incorporating regional actors. This book is dedicated to the presentation of the research findings and the experiences gleaned from two of the projects selected by the BMBF, namely, AgroForNet ('Linking the Producers and Consumers of Woodfuel to Contribute to the Sustainable Development of Rural Areas', Chapter 2) and BEST ('Strengthening Bioenergy Regions', Chapter 3).

The objective of the call from 2008 was the development and implementation of innovative system solutions for sustainable land management. Particular focal points of the funding programme were integrated urban–rural developments and

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Bioenergy from Dendromass for the Sustainable Development of Rural Areas, First Edition.

Edited by David Butler Manning, Albrecht Bemmann, Michael Bredemeier,

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systemic research approaches through which 'new technologies are linked with nontechnical measures and approaches' (BMBF, 2008). Regional supply chains and the integrated management of energy and material flows were placed in the foreground of the research. The three overarching themes of the funding programme were land management, transdisciplinarity and a regional aspect.

1.1.1 Land Management

With the 'Sustainable Land Management' funding programme, the BMBF has strived to initiate an adaptation of land use within Germany and beyond so that the many challenges with respect to food security and energy supply can be met while at the same time providing solutions for the conservation of habitats and ecosystems. The research activities funded were to be novel, and above all, these were to be geared towards sustainability in the use of the land and the resources it provides. The term 'land management' addresses not only agriculture and forestry but all areas occupied by man and includes aspects such as the use and management of water, soil, biodiversity, regional value creation, urban–rural interactions and quality of life.

The sustainable use of the resource land requires the contribution of innovative concepts and strategies for land management and the corresponding knowledge base, technologies, instruments and system solutions (BMBF, 2008). The purpose of the funding programme was to initiate this process in accordance with the objectives of the sustainability strategy (Die Bundesregierung, 2002) and climate protection goals (Die Bundesregierung, 2007; BMUB, 2014) of the German federal government.

1.1.2

Transdisciplinarity

In addition to an integrated approach seeking to address the various dimensions of global and regional change in an overarching context, a central component of the research activities was an action-oriented focus. The objective of the programme was to generate knowledge that the people resident in the study regions can implement directly. To this end, a condition of funding was that the projects adopted a transdisciplinary approach; that is, that decision makers and actors be directly integrated in the research process.

1.1.3 Regional Aspect

The research projects were to be characterised by a strong regional connection, as regions represent 'the basic level of integration for various repercussions of global change' (BMBF, 2008). The regional level is the level at which participation occurs,

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where the regional actors can be effectively integrated within the context of transdisciplinary collaborative research undertakings. The research work carried out in the respective projects was to be thematically anchored in chosen model regions, in order to generate model solutions suitable for transfer to other parts of Germany and further afield.

The 'Sustainable Land Management' funding programme comprised two modules. Whereas module A focussed on 'interactions between land management, climate change and ecosystem services' at the global level, the emphasis of module B was on 'innovative system solutions for sustainable land management' in Germany. Both AgroForNet and BEST were funded within module B of the 'Sustainable Land Management' programme.

1.2

Module B: 'Innovative System Solutions for Sustainable Land Management'

Module B of the funding programme attributed particular significance to regional supply chains and regional energy and material flows. Supply chains were defined as being 'economic relations in the context of the social and spatial interweaving of living, working and recreation, mobility and transport' (BMBF, 2008). Global change, especially with respect to the globalised agricultural and raw material markets, but also phenomena such as migration from rural areas, urbanisation and the regional impacts of climate change demand the flexible and far-sighted adaptation of land use systems to constantly changing framework conditions. Regional supply chains are a cornerstone of an integrated urban – rural development and so are of central importance in this context. For the actors and the decision makers at the regional level, it is generally exceptionally difficult to take into consideration the complex interactions between global and regional change when making decisions with respect to land use. These decisions are usually made on the basis of short-term, often economic considerations. Higher sustainability issues affecting the supply chain as a whole are rarely accounted for (BMBF, 2008). By providing innovative solutions for regional supply chains, and through the integrated management of energy and material flows, the approaches adopted aimed to help overcome these problems and so contribute to sustainable land management as a whole. The innovative system solutions developed as part of the projects funded were to connect and combine new technologies and/or adapt existing technologies with new concepts for the provision of services and also advanced nontechnical measures. Synergies between current systems, sectors and disciplines were to be sought rather than individual sectoral solutions.

Both AgroForNet and BEST strove to develop sustainable, transferable system solutions in the areas of agriculture and forestry in their respective model regions and to promote a decentralised energy supply based on dendromass (or woody biomass) in rural areas. The focal areas of module B taken on by the two projects were: 1 Bioenergy from Dendromass for the Sustainable Development of Rural Areas

- Innovative supply chains to strengthen sustainable rural economic development.
- Technologies, methods and forecasting instruments for a substantiated assessment of the adaptation requirements for land use systems.
- · Services for the promotion of sustainable land use systems.
- Information and knowledge management in supply chains, strengthening of cooperation and communication between actors.
- · Concepts for a decentralised supply of renewable energies.
- Efficient and sustainable use of resources for production and energy supply.
- · Integrated use of land resources with a particular emphasis on regional supply.

Attendant to this, the consortia funded were required to perform comprehensive analyses as part of their research work, in order to examine the extent to which the system solutions conceived could in fact be deemed sustainable. The social scientific, economic and ecological investigations were primarily geared towards the provision of implementable and action-oriented recommendations for regional development. It is these scientific studies carried out as part of AgroForNet and BEST that make up the core of the work presented in this volume.

1.3

Dendromass Production and Rural Development in the Context of Sustainable Land Management

The 13 projects making up module B of the 'Sustainable Land Management' programme addressed a wide variety of issues (BMBF, 2013), from housing and mobility, through regional infrastructure and zero-emissions communities, to paludiculture and the valorisation of waste materials. In accordance with the central role played by wood in the provision of renewable energy in Germany, and the strategic importance attributed to short rotation coppice (SRC) as a new source of wood (Schubert *et al.*, 2009), the topic was broached in a number of the projects funded in module B. Of these projects, only AgroForNet and BEST had as their central theme the issue of dendromass, as a vital source of bioenergy and as a potential cornerstone of rural development. Although in both projects all potential sources of woody biomass – forests, the open landscape, roadsides, SRC and waste wood – were considered, the emphasis, as reflected in this volume, was on the potential offered by SRC as a means to (i) enhance the wood supply; to (ii) further innovative, woodfuel-based, decentralised energy concepts at local and regional level and finally to (iii) create new opportunities for landowners in rural areas.

Although SRC is no longer entirely novel as a land use concept, it has as yet found little implementation in practice in Germany, reflecting a similar situation in most other parts of Europe. The aims of AgroForNet and BEST were addressed to different regions in Germany and employed different strategies. These goals included clearing up knowledge deficits with regard to SRC and wood-fuel – both deficits in the existing knowledge and deficits in the communication of knowledge – and highlighting pathways to the greater implementation of

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decentralised regional bioenergy solutions based on dendromass. The work carried out in both projects relied on establishing a solid foundation based on ecological and socio-economic scientific research, the findings of which were communicated and implemented in practice in the corresponding model regions in cooperation with a range of partners from agriculture and forestry, contractors, energy providers and various levels of local and regional administration. The processes of research and implementation took place simultaneously rather than consecutively, with the experiences gleaned by all of the actors during implementation of central importance in shaping the ongoing research work.

The AgroForNet project was coordinated by the Institute of International Forestry and Forest Products of the Dresden University of Technology (TU Dresden), while BEST was carried out under the leadership of the Forest Ecosystems Research Section within the Centre of Biodiversity and Sustainable Land Use at the University of Göttingen. In addition to a range of university and other research partners, the two project consortia also included private enterprises in the areas of agriculture and forestry, industry, service providers, energy agencies, state authorities and county and town councils. Between the two projects, five model regions were considered. Whereas the aim in the two central German regions incorporated in the BEST project was to strengthen existing 'bioenergy regions' by highlighting new options, the partners in AgroForNet ultimately sought to establish from scratch multiple, discrete woodfuel-based supply chains in the three project model regions that would continue to function independently after conclusion of the project and act as multipliers for other regions of Germany.

By taking into account and integrating aspects relating to production, nature conservation and landscape ecology in the provision of woody biomass for utilisation in regional systems, it became possible to develop synergies between producers, consumers and service providers from a variety of sectors and so contribute to improved, sustainable land management. The conflicts that emerge as a consequence of competing raw material and land use demands and objectives between the conflicting priorities of individual economic interests and the interests of society as a whole were identified in both projects, analysed and addressed in the creation of woodfuel-based supply chains and in the strengthening of bioenergy regions.

1.4 Added Value of this Joint Book Publication

The three sections of the introduction to this volume (Chapters 1-3) illustrate the broad – and not to mention inter- and transdisciplinary – approach of the research performed in both AgroForNet and the BEST project between the years 2010 and 2014, and the following sections and their chapters will add much more detail to this picture. In addition to the array of scientific information, the reader will get a perspective of the relationship between and the complementarity of the investigations and the findings of both projects. This broad synopsis could not

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have been achieved if the two projects had each published their results in a separate publication or publications. The editors believe that considerable added value has been accomplished by bringing the results together in this book. It is our hope that the reader will find much of interest within these pages documenting the wide range of scientific research carried out to support the attempts made by the two consortia to implement more a widespread provision of bioenergy from dendromass as a means to promote the sustainable development of rural areas in Germany.

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