Problem Statement and Research Issues 1

Abstract

This book analyses and develops overarching concepts for forest policy and forest governance and includes a detailed investigation into the historical discussion on forests. Besides that, the book examines opportunities and limits for negative emissions in a sector that – like peatlands – appears significantly less ambivalent compared to highly technical large-scale forms of geoengineering.

The future development of the land use, land-use change and forestry (LULUCF) sector is of crucial importance for combating climate change and the long-term preservation of natural resources as well as protecting biological diversity (Rogelj et al. 2019; Bologna and Aquino 2020; Pörtner et al. 2021). This is even more the case for the overall land sector including agriculture in general, forestry and other land use (AFOLU). From a climate perspective, the unique characteristic of the sectors is that they do not only account for greenhouse gas (GHG) emissions but also serve as a sink for GHGs. There is an enormous potential for natural carbon storage by soils and the upstanding biomass, particularly forest ecosystems, peatlands and other wetlands as well as arable land, provided these environmental compartments remain intact or are restored and used in a sustainable way, preserving natural functions (Ekardt et al. 2020; Bologna and Aquino 2020; Forsell et al. 2018; Funk et al. 2019; Grassi et al. 2017; Verschuuren 2017). It must be noted, however, that the international law term LULUCF does, in contrast to AFOLU, not cover some core sectors connected to land use that represent high emission levels – namely livestock farming and fertiliser production (Ekardt et al. 2018a; Weishaupt et al. 2020).

In earlier analyses, we have taken a closer look at peatlands that bear the promise of combining negative GHG emissions with biodiversity protection (Ekardt et al.

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2020) – and problematic technological approaches to negative emissions called geo-engineering (Wieding et al. 2020). In the present volume we will focus on the importance of forests, also considering the manifold interactions with other types of land use. This will include a critical review of the controversial natural scientific debate on the potentials of forests regarding climate (and biodiversity) protection. The contribution will serve – besides some historical examinations on the economic, legal, mythical, and societal background – as a basis for a status-quo analysis of forest governance. In the end, this will enable us to draft some optimising regulatory options. All governance analysis will focus on the international and European policy level as the overall framework of forest policy approaches. As we will show, there are manifold reasons why global challenges such as climate change and biodiversity loss should be addressed as far as possible by means of transnational policy instruments (see also Ekardt 2019). This is why, even though thus far forest policy as such is under the competence of the EU Member States, we will assess the EU's climate, energy and agricultural sector, that significantly influence the forest sector and provide an indirect competence for the forest sector on EU level (see also Aggestam and Pülzl 2018).

For decades, the world's forests have faced accelerating degradation and loss, impairing nature's balance, biodiversity and climate protection to a potentially life threatening extent (Grassi et al. 2017; Bologna and Aquino 2020). On the one hand, the irretrievable loss of flora and fauna is weakening functioning ecosystems as the basis of all life on earth (IPBES 2019; Wilkinson et al. 2018; Gómez-González et al. 2020). On the other hand, the sink capacity for GHG emissions – needed more urgently than ever in human history to fight the climate crisis – is steadily decreasing (FAO and UNEP 2020). Since 1990, approximately 420 million hectares of forest have been lost due to their conversion to other land uses (FAO and UNEP 2020). Primary forests, the lungs of the earth, decreased by over 80 million hectares during that time (FAO and UNEP 2020, 18). The development is therefore already close to passing irreversible tipping points (on the example of the Amazon see Staal et al. 2020; Leite-Filho et al. 2019, 2020; Gatti et al. 2014).

One of the main reasons for the ongoing land-use change causing deforestation is agricultural expansion for the production of animal food (cattle ranging, soy bean production). Other causes include palm oil production and various implications of the use of fossil fuels such as growing cities, expanding road construction, etc. (Weishaupt et al. 2020; Rajão et al. 2020; FAO and UNEP 2020, p. xvi; Teng et al. 2020; Taheripour et al. 2019; Ekardt 2019). Today, approximately 70–85% of the world's farmland is dedicated to animal-derived food production, such as meat and dairy products (Poore and Nemecek 2018; on the variation of figures on that: Weishaupt et al. 2020). This shows a tremendous impact on both the occurring GHG emissions from the LULUCF sector and the globally accelerating biodiversity loss due to increased land-use pressure (Hedenus et al. 2014; Poore and Nemecek 2018; Weishaupt et al. 2020). Concerning climate protection, there are estimates that 6.6 Gigatons CO_{2equ} per year, corresponding to 49% of the total GHG emissions of the food sector could be avoided, and sink capacity of terrestrial ecosystems could be enhanced by 8.1 Gigatons CO_2 on average each year in a 100-year timespan assuming a no animal scenario (Poore and Nemecek 2018). While livestock farming for several reasons could (and should) be drastically reduced, but cannot be cut back to zero worldwide, as we have discussed elsewhere (Weishaupt et al. 2020; Stubenrauch 2019; Ekardt 2019; Ekardt et al. 2018a, b), it nevertheless becomes clear that drastically minimised livestock farming and a phasing-out of fossil fuels are indispensable to combat the climate and biodiversity crisis and to protect and/or restore worldwide forests (Clark et al. 2020; Weishaupt et al. 2020; Heck et al. 2018; Mengis and Matthews 2020; Rogelj et al. 2019; Willett et al. 2019; Ekardt 2019). Besides carbon dioxide emissions (CO_2), livestock farming is a main contributor to non-CO_2 emissions such as methane (CH_4), nitrous oxide (N_2O), and nitrogen oxides (NO_x) (Blandford and Hyssapoyannes 2015, 175 et seq.; Frank et al. 2017, 5 et seq.).

However, the exact strategy on forests (and negative emission options in general) is always dependent on the targets that have to be fulfilled. According to Art. 2 para. 1 of the Paris Agreement (PA)[1] global warming should be limited to well below 2 °C compared to pre-industrial levels and efforts should be pursued to stay within a 1.5 °C-temperature limit. We have shown elsewhere (Ekardt et al. 2018b; Ekardt 2019; Wieding et al. 2020) that this implies a legally binding obligation to stay within the 1.5 °C limit. We will see in Sect. 2.1 that this requires zero emissions by 2035. To reach carbon neutrality, zero fossil fuels and a massive reduction of livestock farming are necessary, but not sufficient (see in detail Wieding et al. 2020; Mengis and Matthews 2020; Rogelj et al. 2019). In the future, all inevitably occurring GHG have to be compensated for by the creation of negative emissions in sinks (IPCC 2019; Rogelj et al. 2019; Ekardt et al. 2018b; Heck et al. 2018). The exact amount of negative emissions needed is still an open question as well as how they can be generated. This always depends on the efforts to cut down GHG emissions.

In this context, alongside enhanced soil carbon sequestration in agriculture (Fließbach et al. 2007; Scotti et al. 2013; De Mastro et al. 2019), reforestation, forest restoration and large-scale afforestation are increasingly discussed in IPCC climate scenarios as nature-based negative emission technologies (NETs) (Smith et al. 2014, 12, 18; IPCC 2019). Bastin et al. estimate that globally 1 billion hectares are available for additional forest without using agricultural or urban land. This could contribute to limiting global warming to 1.5 °C by 2050 (IPCC 2019; Bastin et al. 2019). However, there is a lively scientific debate on the degree to which forests and natural sinks in general can or have to contribute to climate protection or whether large-scale technical approaches in the field of geoengineering have to be considered as well (IPCC 2019; Bastin et al. 2019; Veldman et al. 2019; Scurlock and Hall 1998; Selva et al. 2020; Bond and Keeley 2005). Most geoengineering techniques are thus far still in development and might pose additional threats to human rights, while their effectiveness in climate protection remains largely unproven (Heck et al. 2018; IPCC 2019, 96; Wieding et al. 2020). In contrast, natural sinks like forest ecosystems already play an important role in stabilising the climate (Grassi et al. 2017). One focus of the book (Chap. 4) will therefore be a critical assessment of the

[1] Paris Agreement (PA), United Nations 2015, Paris, France.

potentials of forests ecosystems in climate as well as for biodiversity protection (IPCC 2019; IPBES 2019; Wieding et al. 2020).

Building on that in Chaps. 5 and 6, the most effective design of policy instruments that steer a respective land use which integrates forests as a key component for climate and biodiversity protection is derived. Potential trade-offs between climate, biodiversity protection, the need to globally secure food security and the increasing need for biomass in a post-fossil world are considered. Already existing legal instruments in the context of forests from international, transnational and in some cases (as an example) also national approaches will be assessed regarding their governance effect. The overarching research question is, how forest governance as one crucial part of land-use governance has to be designed to be in line with the climate target of Paris Agreement and the Convention on Biological Diversity[2] (CBD). The study will function as a complement to our earlier studies on peatlands, on large-scale geoengineering, on land-use-based mitigation and others (Wieding et al. 2020; Ekardt et al. 2018b, 2020; Stubenrauch 2019; Garske 2020; Ekardt 2019; Garske et al. 2020). In these studies, some problems in governing the land use sector have already been identified, especially the problem of depicting climate and biodiversity effects in highly heterogeneous landscapes. Such problems will also play a major role in the present study which will, by these means, contribute to the overall discussion in sustainability governance on various policy instruments such as regulatory law, subsidies, levies, and cap-and-trade schemes.

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