



Article

Assessing the Wall-to-Wall Spatial and Qualitative Dynamics of the Brazilian Pasturelands 2010–2018, Based on the Analysis of the Landsat Data Archive

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Abstract: Brazilian livestock is predominantly extensive, with approximately 90% of the production being sustained on pasture, which occupies around 20% of the territory. It is estimated that more than half of Brazilian pastures have some level of degradation. In this study, we mapped and evaluated the spatiotemporal dynamics of pasture quality in Brazil, between 2010 and 2018, considering three classes of degradation: Absent (D0), Intermediate (D1), and Severe (D2). There was no variation in the total area occupied by pastures in the evaluated period, in spite of the accentuated spatial dynamics. The percentage of non-degraded pastures increased by ~12%, due to the recovery of degraded areas and the emergence of new pasture areas. However, about 44 Mha of the pasture area is currently severely degraded. The dynamics in pasture quality were not homogeneous in property size classes. We observed that in the approximately 2.68 million properties with livestock activity, the proportion with quality gains was twice as low in small properties compared with large ones, and the proportion with losses was three times greater, showing an increase in inequality between properties with more and fewer resources (large and small properties, respectively). The areas occupied by pastures in Brazil present a unique opportunity to increase livestock production and make areas available for agriculture, without the need for new deforestation in the coming decades.

Keywords: Landsat; pasture degradation; Brazilian pasturelands dynamics; low carbon agriculture



Citation: Santos, C.O.d.; Mesquita, V.V.; Parente, L.L.; Pinto, A.d.S.; Ferreira, L.G., Jr. Assessing the Wall-to-Wall Spatial and Qualitative Dynamics of the Brazilian Pasturelands 2010–2018, Based on the Analysis of the Landsat Data Archive. *Remote Sens.* **2022**, *14*, 1024. <https://doi.org/10.3390/rs14041024>

Academic Editor: Sandra Eckert

Received: 4 January 2022

Accepted: 14 February 2022

Published: 20 February 2022

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1. Introduction

Brazil has the second largest cattle herd in the world, being the second largest producer and the largest exporter of meat [1–3]. However, its livestock is not very productive, requiring a herd larger than the European Union and the United States combined, to produce approximately half of the beef achieved by both [1,3]. One of the reasons for its low productivity is that the Brazilian livestock is predominantly extensive, with more than 90% of the herd being sustained on pasture [4]. For this reason, pastures occupy a large territorial extension, approximately 20% of the country's territory [5]. In recent decades, there has been a marked growth in the livestock activity and, consequently, a great expansion in areas occupied by pastures [5–8]. The expansion of the area occupied by pastures and deforestation are strongly correlated, since forage cultivation is usually the first use in areas of conversion of native vegetation [5,9–11]. Likewise, the process of loss of productivity at levels that make the rancher abandon its land and look for places to install new pastures needs to be understood so that more efficient management practices can be introduced.

Pasture degradation is one of the main causes of productivity loss in the Brazilian livestock system, and a challenge faced by the sector for decades [12,13]. The process