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A multicriteria gis-based approach for mapping biomass agricultural residues availability for bioenergy facilities

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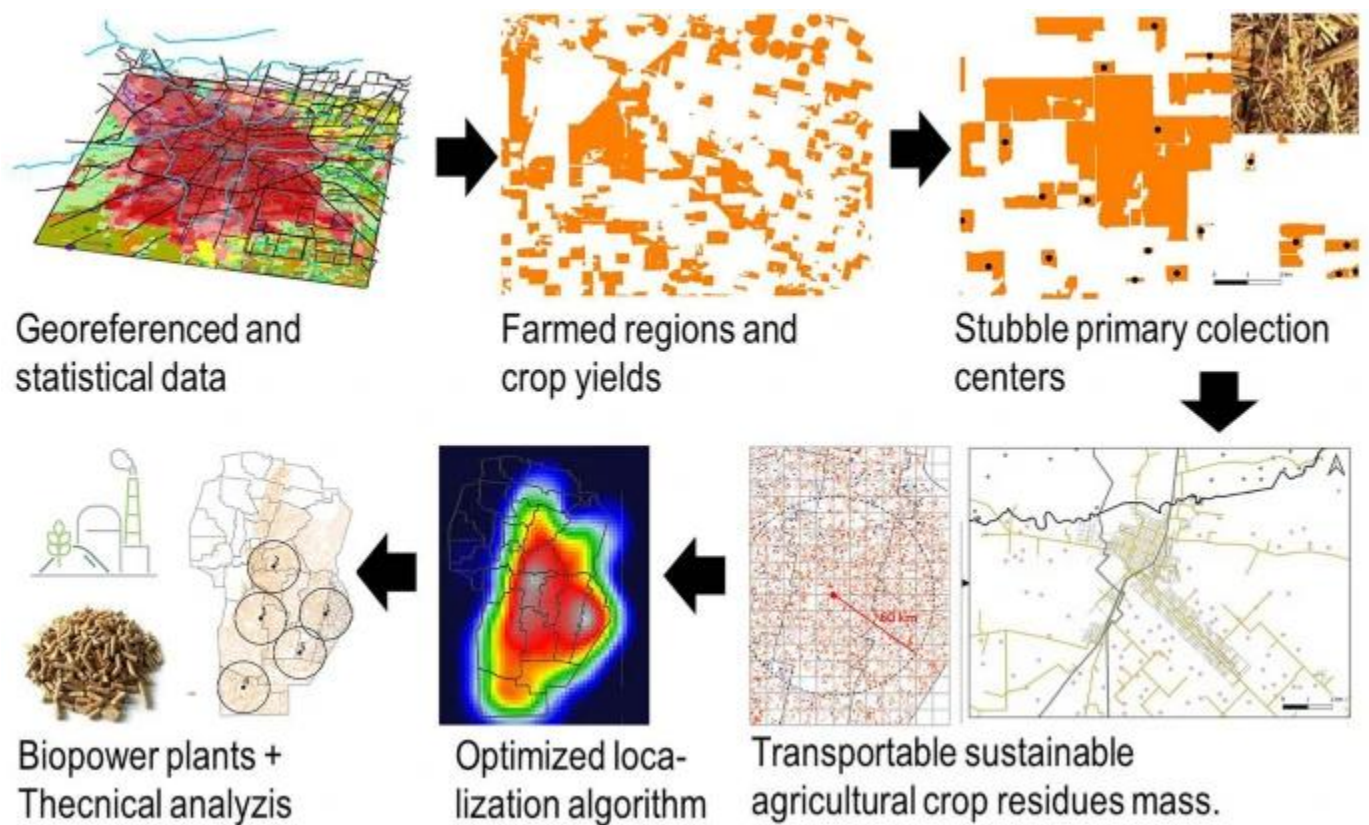
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Abstract

The development of accurate bioenergetic models, that simulate scenarios for decision making and policy planning contributions, has become a necessity in the actual climate crisis context. The objective of this work is to develop a multicriteria methodology to evaluate scenarios for assessing a region's bioenergetic potential and determining optimal location of biopower plants. This method utilizes a geographic information system that incorporates local biomass distribution, crop harvest statistics, detailed yield data, preference and exclusion maps. The approach examines the current local use of residues in the context of long-term soil preservation, employing sustainable residue removal. When it is applied to the Province of Córdoba, Argentina, specifically assessing main agricultural harvest residues, the model identifies 1.8 million tn/year of theoretical residues, primarily from corn and soybean, revalorizing only 4.1% of the available harvest agricultural residues. When employing the most commonly used approaches in the

literature, which involves average crop yield values for extensive regions, our results show an underestimation of theoretical biomass up to 26%. This makes it essential to incorporate greater detail in the modeling. After optimizing five biopower plants, each with a collection radius of 60 km, it becomes possible to convert 59% of these residues into bioenergy, generating 2.3 GWh/year, covering up to 23.3% of Córdoba's annual electricity demand. The novelty of this research resides in the development of a high detailed multicriteria methodology, which facilitates the fast simulation of scenarios to identify optimal biopower plant locations, applicability to different biomass types and bioenergy forms for extensive regions.



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En el siguiente enlace: [Supplementary file1 \(DOCX 14891 kb\)](#) puede consultar Supplementary Information