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Drivers of multi environmental impacts embodied in international rice trade

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Global rice production and trade have strongly increased in recent years. Trade of rice corresponds to a high share of virtual resources shipped from a country to another one. While most of the studies have focused on single impacts embodied in international trade of agricultural products, this study reveals a complete overview of the three most relevant resources/impacts embodied in international rice trade such as water, land and CH₄ emissions. Our analysis includes more than 160 countries for the period 2000-2016 by using country-specific impact factors. This trilateral analysis allows the assessment of tradeoffs between different impact categories and relative discussion about international trade policies. Indeed, while the outcome of the impacts embodied in trade is mostly due to the volume of rice traded, the three country-specific impact factors such as water demand, yield and emission factor also determinate the results thus revealing tradeoffs among the three impacts generated. Existing trade flows are mainly led by economic aspects rather than focusing on environmental performances. We conclude that international policies should lead developing countries, which are the largest exporters of rice and have a lower efficiency production, to invest in the improvement of their environmental performances thus maintaining their international market competitiveness.