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## The trade-off between vegetation restoration and soil & water conservation in Loess Plateau, China

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China has implemented an ambitious ecological project Grain for Green Project (GGP) on the Loess Plateau (LP) at the end of last century. The GGP was to increase vegetation coverage, reduce soil and water erosion and store Carbon by converting croplands on steep slopes barren hills and wasteland to forests. Assessing the ecological effects of GGP correctly could improve vegetation restoration activities worldwide. In this study, two major ecological indicators (vegetation restoration and soil & water conservation) were used to evaluate the ecological benefits of GGP from 1982 to 2017. Our results show that the vegetation growth for most pixels of LP region have significantly increased at 21 century, annual growth rates of fraction of absorbed photosynthetically active Radiation (FPAR) in spring, summer, autumn and active growing season are 1.39, 4.49, 2.14 and 1.47, respectively. For leaf area index (LAI), these growth rates are 6.01, 20.06, 8.11 and 6.90, respectively. And for normalized difference vegetation index (NDVI), growth rates are 6.30, 25.46, 7.99 and 20.43, respectively. While the soil and water condition has differently changed, annual growth rates of soil moisture (SM) are 4.46, 2.79 and 2.30 for summer, active growing season and whole year, respectively. The coordinated responses of vegetation and soil & water condition suggest that the interaction between organisms (vegetation, animal and human) and environment (soil, water and so on) in the process of vegetation restoration should be further recognized to evaluate the benefits of ecological engineering more comprehensively.