Balancing carbon and water for sustainable revegetation in the Loess Plateau

With the support by the National Natural Science Foundation of China and the Major Programme of High Resolution Earth Observation System, the research team led by Prof. Fu Bojie (**傅伯杰**) at the State Key Laboratory of Urban and Regional Ecology, Research Center for Eco-Environmental Sciences of Chinese Academy of Sciences, cooperated with the researchers from Peking University and the Laboratoire des Sciences du Climat et del'Environnement (LSCE), reported recently on the sustainability of the massive revegetation in the Loess Plateau, which was published in *Nature Climate Change* (2016, 6: 1019-1022).

The "Grain to Green Programme" (GTGP) of China is the largest ecological restoration programme ever implemented in a developing country. The Loess Plateau is the area experiencing the most extinguished improvement of land cover and ecosystem services since the implementation of GTGP in the late 1999. The field observation also declared the decreases in runoff and soil moisture in this area, causing a research focus on the sustainability of the massive revegetation in the water limited Loess Plateau. This study has quantified water demand of planted vegetation through the combined usage of *in situ* measurement, satellite observation and ecosystem modeling, and discovered the threshold of vegetation capacity by proposing a framework in terms of both ecological and socio-economic resource demands in a coupled anthropogenic-biological system. It also points out that the current revegetation in the Loess Plateau is close to the threshold limit. The future climate change will modify permissible NPP from a minimum of 383 g C m^{-2} yr^{-1} to a maximum of 528 g C m^{-2} yr^{-1}.

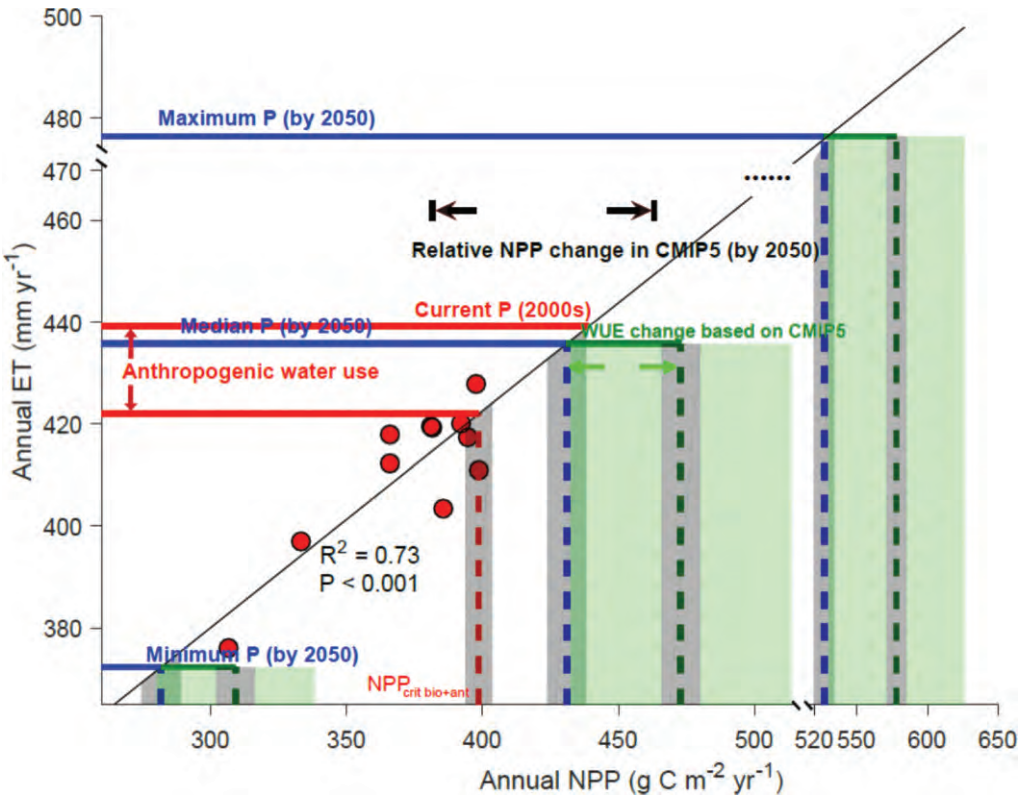

Figure NPP thresholds of revegetation in the Loess Plateau.