Synergies and inconsistencies between two modelling approaches to predict the vegetation dynamic distribution in riparian semi-arid environments

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Deterministic models have been reported as valuable tools to predict the vegetation distribution in riparian semi-arid environments. Riparian plants behaviour is directly linked to the river hydrology. In consequence, every modelling approach must consider the main hydrological and ecological processes that take place on this type of ecosystems. In this contribution, two recent models that are able to reproduce the vegetation dynamic distribution en semi-arid riparian zones have been analyzed. The first model, called RibAV, compares the performance of different riparian and terrestrial plant functional types through a mathematical distributed modelling approach. RibAV estimates daily evapotranspiration rates from the unsaturated and the saturated zones of the soil. It is assumed that differences on evapotranspiration capabilities determine the spatial distribution of the plant communities under the same environmental conditions in semi-arid regions. The second model, CASiMiR-vegetation, with an annual time step, relates the vegetation distribution on riparian areas to main hydrological processes that physically determine the recruitment and development or the retrogression between successional phases. The models have been previously implemented with good results in the case studies, two river reaches sited on semi-arid Mediterranean environments. One of the reaches is under natural conditions while the other is under flow regulation. Synergies and inconsistencies between the results offered by both models are presented for the first time, as well as the strengths and weaknesses of each model. The conclusions provide important knowledge and considerations necessary to bring up new improved approaches.