

報告番号	甲 第 12876 号
------	-------------

## 主 論 文 の 要 旨

論文題目 **Initial Recruitment Mechanism of  
Riparian Vegetation onto Bare Bar in  
Sand Bed River**  
(砂床河川における裸地砂州への植生初期  
侵入機構)

氏 名 周 月霞

### 論 文 内 容 の 要 旨

It is important to identify the recruitment zone of riparian vegetation and the mechanism of vegetation recruitment since the recruitment of riparian vegetation may promote vegetation (forest) expansion, which can reduce the flood passage capacity and alter ecological balances. This dissertation focuses on the initial recruitment of riparian vegetation onto bare bar. Three processes of the phenology of initial recruitment of vegetation, i.e., seed dispersal, seed germination and seedling settlement, were considered in this study.

There are three main objectives of this study. The first is the classification of the seed distribution and seed dispersal method to bare bar, including shoreline and upland area. The second objective is to expound the distribution of initial recruitment of riparian vegetation onto bare bar and its influencing factors. The last main objective is to propose new initial recruitment model for predicting the potential initial recruitment zone and the coverage rate of vegetation. To achieve the above three objectives, the following contents are arranged in this dissertation.

Chapter 1 introduces the research background, previous related studies. The processes of vegetation dynamics and the relationship between riparian vegetation dynamics and hydro-morphology were outlined based on the previous studies. The study objectives of this dissertation are also stated in this chapter.

Chapter 2 introduces the distribution characteristics of seeds in upper soil and seed dispersal methods of bare bar. Generally, the relative large flood and shoreline area were considered in the previous studies and they were considered in this study too. As a new proposal of this study, different flow regimes and ground surface undulation such as dunes at the upland area of bare bar were also considered. The field investigation of accumulated seeds distribution in the upper soil layer of the bare bar under different flow regimes was conducted first. Then the possible influencing factors on seeds distribution and the possible methods of seed dispersal were analyzed. The investigation results showed that moderate floods were the most favorable condition for seed dispersal and seed accumulation. Hydrochory and wind dispersal seem to be the dominant methods of seed dispersal to the shoreline and the upland area of bare bar, including flat area and dune of bare bar, respectively.

Chapter 3 introduces the classification of initial recruitment zone, and distribution characteristics of the initial recruitment of riparian vegetation. The land cover condition and river morphology were investigated by using UAV monitoring method. The distribution characteristics of initial recruitment zone and coverage rate of vegetation were analyzed by referring the high resolution of the UAV field survey results in ArcGIS. The field investigation results showed that the initial recruitment zone concentrated mainly along the shoreline, which has close relationship with the relative elevation, and the downstream side of dune of upland area of bare bar, which was a new discovery in this research. The coverage rate of riparian vegetation presented the decreasing trend from the internal boundary to the external boundary of the initial recruitment zone along the shoreline.

Chapter 4 introduces the possible influencing factors for the distribution of initial

recruited riparian vegetation. The seeds distribution in upper soil, hydrological variable (e.g., inundation frequency and spring flood), and physical environment of bare bar were discussed in this chapter. The influencing factors on the distribution of the initial recruitment of riparian vegetation were analyzed by referring the field survey data and 2-D flow simulation results. The analyzed results showed that the physical environment of the bare bar, such as water content, was more significant than the seed density for the initial recruitment of riparian vegetation. The greater surface roughness, e.g., vegetation litter and gravel on river bed surface, may promote the initial recruitment of vegetation more. The location of the initial recruitment zone was determined by the annual maximum flood and the inundation frequency during the seed dispersal period.

One initial recruitment model with the consideration of the relationship between seeds and sediment distribution and the relationship between initial recruitment condition and hydrology was proposed in Chapter 5. The potential initial recruitment zone and the coverage rate of riparian vegetation at the initial recruitment zone were simulated by using the proposed the initial recruitment model. The internal and external boundary of the initial recruitment zone was determined by considering the inundation frequency and flood magnitude during the seed dispersal period, respectively. The coverage rate of vegetation was calculated as the function of inundation frequency and the souring force of spring flood. The simulation results showed that the proposed initial recruitment model can well predict the initial recruitment zone and approximately represent the coverage rate of vegetation, and this means the inundation frequency and spring flood are dominant factors for the initial recruitment of riparian vegetation.

Chapter 6 outlines the conclusions of this dissertation and proposes the contents that should be further studied in the future.