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## Research on the Technology of Anti-Erosion and Vegetation Promotion for Pisha Sandstone Region in the Middle Yellow River Basin

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Pisha sandstone region is the most vulnerable and the most dramatic area of soil erosion, and it is also the concentrated area of the coarse sediment entering into the Yellow River. It is of great significance to research the anti-erosion and vegetation promotion technology in the Pisha sandstone region. Based on the new concept of anti-erosion and vegetation promotion, surface composition, chemical properties and particle structure of the Pisha sandstone particles were analyzed, and the lithologic mechanism of the easy-corrosion of the Pisha sandstone was revealed. High-tech materials suitable for anti-erosion and vegetation-promoting of Pisha sandstone was developed. A Pisha sandstone dam using modified silt has been built. The field experiments were monitored for the effects of the anti-erosion and vegetation-promoting technology on controlling soil erosion. The results showed that: (1) The grain structure and pore cementation of Pisha sandstone leading to the high affinity of the Pisha sandstone and water; The high content of montmorillonite, calcite and feldspar and the development of pore micro-structure in the Pisha sandstone are the main reasons for the poor soil erosion resistance of the Pisha sandstone. (2) Anti-erosion and vegetation-promoting materials (W-OH) based on hydrophilic polyurethane resin combined with anti-UV stabilizer, aquasorb and vegetation growth promoter can encapsulate the Pisha sandstone particles and compose the composite with Pisha sandstone for erosion resistance and vegetation promotion, degradation control, freeze-thaw resistance, hydrolysis resistance and environmental friendliness. (3) The simulation analysis of materials and technology for the dam construction was carried out by using mechanics and chemical experiments. The dam design scheme and key procedures were further verified based on the field experiment, and the dam construction using modified materials of pisha sandstone was developed. The silt dam using modified Pisha sandstone was built in the Erlaohugou watershed. The dam height is 10.03 m, the controlled watershed area is 0.31 km<sup>2</sup>, and the total storage capacity is 32,600 m<sup>3</sup>. (4) According to the grading of different slopes of the Pisha sandstone and the diversity of its composition, the allocation model of the anti-erosion and vegetation-promoting treatment measures for the Pisha sandstone was proposed. In the top of the slope area, three-dimensional ecological measures such as grass, shrub and arbor mixed with intercepting ditch and other engineering measures were arranged. The technology of spraying anti-erosion and vegetation-promoting materials of low-concentration and planting vegetation measures was used on gentle slopes; the measures of spraying anti-erosion and vegetation-promoting materials of

high-concentration combined with vegetation growth was adopted in steep slopes, and the consolidation material is sprayed to prevent weathering and gravity erosion of the Pisha sandstone. (5) The analysis of field plot data showed that the Anti-erosion and vegetation-promoting composite materials and the measures had obvious effects of controlling slope runoff, reducing soil erosion and vegetation restoration compared with the bare soil plot, the runoff was reduced by more than 70%, the sediment yield was reduced by more than 90%, and the vegetation coverage was reached over 95%.