

ABSTRAK

Permasalahan kerusakan tebing sungai akibat erosi dan longsor banyak terjadi di Indonesia. Perbaikan kerusakan tebing sungai banyak dilakukan dengan membangun infrastruktur berupa krib, *revetment*, *lining*, dinding penahan, turap maupun tumpukan batu, atau balok beton. Penanganan kerusakan juga dilakukan secara vegetasi dengan menggunakan pohon, *lives stakes*, ranting menjalar, penanaman benih/biji, dan rerumputan. Pelindung tebing vegetasi lebih ramah lingkungan sesuai dengan kegiatan restorasi sungai yang membentuk ruas sungai yang lebih alamiah. Penelitian ini bertujuan untuk menghasilkan batu bata *interlock* dan tanaman akar wangi (*Vetivera zizanoides*) untuk konstruksi bangunan pelindung tebing *hybrid*. Pelindung tebing batu bata *interlock* memiliki kelebihan dapat memperkuat kestabilan lereng, memiliki lubang-lubang peresapan untuk aliran air tanah, sedang tanaman akar wangi dapat berfungsi mengikat material seperti mortar, ramah lingkungan serta lebih alamiah yang mendukung proses restorasi sungai. Metode dalam penelitian ini adalah ekperimental dengan uji di laboratorium dan uji *prototype* di lapangan. Penelitian di laboratorium untuk mengetahui spesifikasi teknis batu bata dan menemukan tata cara menyusun batu bata. Penelitian di lapangan untuk menemukan kemampuan menahan kecepatan aliran, kekuatan tanaman akar wangi, serta pengaruh bangunan terhadap proses restorasi sungai.

Hasil penelitian adalah menemukan bentuk batu bata *interlock* yang dapat dikombinasikan dengan tanaman akar wangi. Dimensi batu bata adalah 25 x 12,5 x 10 cm dengan dua buah lubang di atas dengan diameter 5 cm, sedangkan diameter lubang samping adalah 3,75 cm. Fungsi lubang adalah untuk pertumbuhan akar tanaman agar dapat mengikat material batu bata satu dengan lainnya. Massa jenis batu bata kondisi kering adalah 1,196 ton/m³, kondisi basah dengan lubang diisi tanah adalah 1,677 ton/m³, kemampuan menahan tekanan dari atas adalah 42,33 kg/cm², kemampuan lubang menahan tarik adalah 37,32 kg/cm², nilai kohesi dan sudut geser dalam batu bata yang lubangnya berisi tanah adalah $C_b' = 0,599$ kg/cm² dan $\phi_b' = 34,606^\circ$, lubang batu bata berisi akar wangi usia 6 bulan $C_{v6}' = 0,638$ dan $\phi_{v6}' = 36,38^\circ$, dan lubang bata berisi akar wangi usia 12 bulan $C_{v12}' = 0,734$ kg/cm² dan $\phi_{v12}' = 43,32^\circ$. Kecepatan aliran maksimum yang dapat terukur adalah 3,3 m/dt. Kondisi ekosistem ruas sungai sebelum dan setelah pembangunan pelindung tebing sungai tidak mengalami perubahan. Pelindung tebing sungai *hybrid* ini terbukti lebih alamiah dan dapat mendukung proses restorasi sungai.

Kata kunci: pelindung tebing sungai *hybrid*, bata *interlock*, akar wangi, restorasi sungai.

ABSTRACT

*The problem of river bank damage due to erosion and landslides often occurs in Indonesia. To repair of river bank damage is mostly done by building infrastructure in the form of groves, revetments, linings, retaining walls, sheet piles and rip-rap stones or concrete blocks. Rehabilitation can also use lives trees, lives stakes, creeping branches, planting seeds (Seeding and seed sprying) and grass plants. River bank protection efforts with plants are more environmentally friendly in accordance with river restoration activities. One of the goals of river restoration is to form a more natural river segment. Trial of piles of rip-rap stones or concrete blocks with grass plants between stones or concrete blocks has many advantages from an ecological aspect. The weakness of the trial is that there is still no unity between construction materials and plants. This study aims to develop interlock bricks made from burnt clay as river bank protection and to find the effect of vetiver root plants (*Vetivera zizanoides*) in strengthening the stability of brick river bank protection into a hybrid construction.*

The method in this research is experimental with laboratory tests and prototype tests in the field. Research in the laboratory to find out the technical specifications of bricks and find procedures for arranging bricks. Research in the field to find the ability to withstand flow velocity, the strength of vetiver plants, and the effect of buildings on the river ecosystem.

The results of the study found the shape of interlock bricks that can be combined with vetiver plants equipped with holes in the middle of the height of the brick. The dimensions of the bricks are 25 x 12,5 x 10 cm with the diameter of the top two holes being 5 cm while the diameter of the side holes is 3,75cm. The function of the hole is for the growth of plant roots so that they can bind the brick material to one another. The density of the conditions without holes filled with soil bricks is 1,196 tons/m³ in wet conditions with holes filled with soil is 1,677 tons/m³, the ability to withstand pressure from above is 42.33 kg/cm², the ability of the holes in tensile strength is 37.32 kg/cm², the value of Cohesion and internal shear angles for soil-filled bricks are soil $C_b' = 0.599$ kg/cm² and $\phi_b' = 34.606^\circ$, brick holes filled with vetiver content 6 months old $C_{v6}' = 0.638$ and $\phi_{v6}' = 36.38^\circ$, and brick holes filled with vetiver for 12 months, $C_{v12}' = 0.734$ kg/cm² and $\phi_{v12}' = 43,32^\circ$. The maximum measurable flow rate in the field is 3.3 m/s. The condition of the river segment ecosystem before and after the construction of the river bank protection did not change. This hybrid river bank protection has proven to be more natural and can support the river restoration process.

Keyword: hybrid river bank protection, interlock brick, vetiver, river restoration.