



InCom - WORKING GROUP 128

Alternative Bank Protection Methods for Inland Waterways

1. Background

Since the mid 1980's, considerable interest has grown in the use of softer forms of bank protection to reduce costs, increase environmental benefits and more recently to demonstrate sustainable construction. In 1987 PIANC produced guidelines on the design and use of such techniques which were well-received and used to create industry standards.

In 2007, PIANC InCom WG27 reported that an increasing number of alternative bank protection measures are being implemented across the world in navigation channels, for example:

- Bio-engineering as reed planting or live willow fascine,
- Bio-technical engineering as grass composite, vegetated pocket fabric geo-textiles, rock and fibre rolls, plantedcoir pallets, and
- Structural engineering as timber revetments, wattle hurdles and timber piling.

However there is very limited published guidance based on actual experiences with existing alternative bank protection methods that identifies effective alternatives that can be used under specific project boundary conditions, as per the following reports

- Waterway Bank Protection: A Guide to erosion assessment and management (Cranfield University/UK on behalf of British Waterways, 1999),
- Stability thresholds for stream restoration materials (Craig Fischenich, ERDC, USACE, 2001),
- Alternative bank protection methods – Quantification of permissible hydraulic impacts from shipping and possibilities to application for German waterways (Federal Waterways Engineering and Research Institute, Germany, 2006),
- Investigating alternative technical-biological bank protection methods for inland waterways. Part 1: Motivation, national and international surveys (R&D-Project-report of the Federal Institute of Hydrology and Federal Waterways Engineering and Research Institute, Germany 2006) [Note: Only available in German: Untersuchungen zu alternativen, technisch-biologischen Ufersicherungen an Binnenwasserstraßen. Teil 1: Veranlassung, Umfrage und internationale Recherche.]
- Bank protection utilising geo-textiles and vegetation (PIANC, 1996),
- Guidelines for the design and construction of flexible revetments incorporating geo-textiles for inland waterways (PIANC, 1987).

Some of these documents were used in the WG27 report “Considerations to Reduce Environmental Impacts of Vessels” to select adequate mitigation measures.

Further work has recently been undertaken by other PIANC Working Groups, namely MarCom 56 (Application of geo-textiles in waterfront protection) and CoCom 2 (Best practices for shoreline stabilization methods), to consider the use of geo-textiles in a coastal environment.

These guides, however, do not clearly state how effective these bank protection techniques have proven to be in operation, they only list a few examples based on results soon after installation. Presently there is not enough information available to avoid repeating mistakes of inappropriate installation of innovative bank protection!

Whilst there is limited existing knowledge, there is an increasing pressure for those involved in channel design and maintenance to adopt new techniques on the assumption that these will better meet the following requirements:

- Engineering
- Ecological,
- Economic,

rather than the use of traditional engineering solutions such as riprap or sheet piling. Consequently there is a need for collecting and assessing existing experiences with alternative bank protection methods to form a basis for an objective decision making tool for waterway improvement and management.

2. Objective

The objective of the new InCom Working Group is to understand, evaluate and report on the effectiveness of innovative (alternative) bank protection measures, as related to different impact influences and boundary conditions, to fulfil the technical purposes and additionally to improve the ecological conditions. To formulate recommendations based on results obtained from assessments of physically implemented schemes.

From the European perspective, the mandate of the Water Framework Directive and other initiatives has created a requirement for results that should be available as soon as possible. Therefore restrictions on the range and extent of the field of inquiry are necessary. To create an even more finite scope of activity by the working group, bank protection in lakes should be viewed as extraneous to the report.

Maintenance costs and details of ecological monitoring for selected alternatives must be available for a point in time at least one year after installation and must be included in the report.

Project details should include water body type (e.g., free flowing and dammed rivers, canals), climate, water level variation, flow velocity (both fast and slow), substrate of the banks, bank slope, distance to fairway, ship types and hydraulic impacts from shipping.

Information should be collected on successful and, to the fullest extent possible, on unsuccessful applications looking back over the last twenty years. It is felt that this is an appropriate timescale commensurate with the development of these techniques and will allow a full review to be undertaken to see how vegetative protection techniques have matured or not !

3. Suggested final products

The new WG should deliver a report as a printed PIANC report. It should also be in electronic format to be made available on the internet. It should describe a broad range of different bank protection projects and associated data on their effectiveness. It should present a matrix of the circumstances under which each type of innovative bank protection has been shown to be effective for one or more of the following aspects: economic, ecological, or engineering design.

4. Recommended Members

- Public/Private organisations
- Organisations representing stakeholders in the inland waterways system
- Bank protection experts and contractors
- Environmental and drainage regulators

5. Relevance for countries in transition

The benefits of promoting the development and use of bio-engineering techniques is considered vital in both Countries in Transition, and developing countries, in protecting against the pressures associated with increasing economic development and growth.