

## **International Workshop on Geo-Synthetics and modern materials in coastal protection and related applications; 6-7 August 2010, Madras, Chennai, India.**

### **General:**

The first of its kind, this workshop was organised jointly by Department of Ocean Engineering, I.I.T.Madras, India and Committee on coastal and maritime hydraulics of IAHR. Prof. V.Sundar (Chairman, IAHR-APD) and Prof. S.A.Sannasiraj were coordinators from IIT Madras, while, Dr. Gary Mocke was the coordinator from CMH of IAHR. The guest of honour for the inaugural function of the workshop was Prof. N.Tamai, President, IAHR.

There were about 80 delegates, among whom, 2 from Bangladesh, one each from UAE and Mexico participated. The lectures were delivered by 18 speakers, 11 from India, 2 from The Netherlands, 2 from UAE and one each from Oman and Malaysia. The proceedings were brought out in the form of CD-Rom covering all 20 presentations.

Geo-synthetics and geo-systems constitute potential alternatives for more conventional materials and systems. They deserve to be applied on a larger scale. However, doubts among specifying authorities and design engineers about the quality of the design criteria for some of the products, and the long-term performance, are still the limiting factors in their increased application. It is hoped that the results from the literature and recent international research will help to overcome some of these doubts and will be used as a basis for learning and promoting in the application of geo-synthetics and geo-systems.

The basic material for geo-systems is geo-textile or, in general, geo-synthetics. In-depth knowledge of these materials (technological properties, design specifications, test methods, etc.) is absolutely essential for a proper choice of material needed to fulfil the functional requirements of geo-systems resulting from the specific requirements of a project under consideration. Information on some these aspects can be found in a number of publications, textbooks, manuals and design guidelines. Moreover, the designer should bear in mind that geo-textiles and geo-systems are only a part (or a component) of the total project and that they have to be treated and integrated in the total perspective of a given project

Systematic (international) monitoring of realized projects (including failure cases) and evaluation of the prototype and laboratory data may provide useful information for verification purposes and further improvement of prediction methods. It is also the role of the national and international organizations to identify the lack of information and to launch a multiclient studies for extended monitoring and testing programmes, to provide users with an independent assessment of the long-term performance of geo-synthetics and geo-systems.

The final conclusion on the use of the fill-containing geo-systems can be formulated as follows:

There are promising developments in the knowledge on basic processes involved, calculation method and design and execution techniques, however, there still remain uncertainties in the existing design methods. Therefore, further improvement on the design methods and more practical experience under various loading conditions is still needed. The monitoring of the

implemented project will contribute strongly to further verification and improving of design methods.

Special attention should be paid to the durability aspects of geo-systems, especially under exposed conditions, and to repair techniques. There is an urgent need on these aspects particularly for tropical countries.

There is an urgent need for internationally accepted guidelines for design and application of geo-systems. The IGS in cooperation with other international organisations (i.e., PIANC, IAHR) should undertake actions in this direction.

Finally, there is a rapid development in the field of geo-synthetics and geo-systems, and there is always a certain time gap between new developments (products and design criteria) and publishing them in manuals or speciality books. Therefore, it is recommended to follow the professional literature on this subject (Journal of Coastal Engineering, Journal of Geo-textiles and Geo-membranes, Geo-synthetics International, Geo-technical Fabric Report and Proceedings of Geo-synthetic Conferences) for updating the present knowledge and/or exchanging new ideas.. Also, regular organizing of workshops (low-cost) with researchers, designers and potential users should be further stimulated for this purpose.

#### **Specific Recommendation of the workshop:**

- Selection and specification of geo-synthetic properties for various applications (revetments, shore protection, breakwaters, geo-systems, etc.)
- Influence of fill-ratio on performance on design and performance of geo-systems
- Influence of fill material on performance (sand, mud, silt materials, clay, coarse materials, saturated, unsaturated, etc.)
- Hydraulic interactions; reflection, transmission, permeability, roughness
- (More) Uniformity in stability formulations and limits of application in various applications (on slope, offshore, submerged, emerged, singular, stacked, etc.))
- Internal (in-)stability of system (internal migration)
- Scour prediction and protection
- Stimulating research in field of geo-systems
- Clear definition of applicability of woven and non-woven materials and proper guidelines
- Durability of geo-synthetics and geo-systems for tropical weather conditions
- Accuracy of placement of geo-systems
- Review of construction techniques (uniform pumping geo-tubes, anchoring, filling and releasing geo-containers-stacking units, etc.)

- Techniques for the removal of damaged units.
- Construction specifications
- Quality control (strength of seams and length effect)
- Cost effectiveness of geo-systems compared to conventional structures
- Monitoring techniques
- Involving clients in research and systematic monitoring
- Preparing (and regular updating) of design guidelines
- Improving exchange of knowledge (forming of working groups within IAHR or similar organisations)
- Organizing a forum/platform for contacts and exchange of information (how to avoid confidentiality ?)