Venice and its Lagoon

Engineering geological conditions and problems:

Before human settlement, the lagoon of Venice was interested both by the progressive silting up from the rivers (Brenta, Piave, Sila) and by sea-storms that provoked damage to the coast.

In the last three centuries, the shifting of the rivers has provoked an extension of the lagoon and, as a consequence, a bigger hydraulic activity of the channels.

Today, the bigger problem is the "high water" phenomenon. The origin of the phenomenon is mostly natural (tides, wind and eustasy) but also anthropic (subsidence and the utilisation of motor-boat instead of gondolas). The water reached 194 cm on the mareographic zero in 1966.

Moreover, the rivers of the North part of the lagoon flow in the sea several poisons of agricultural, industrial and civil origin.

Finally, because of the particular condition of the ground, the foundation of buildings are affected by rapid deterioration.

St. Mark's Basilica during "high water" *(www.pegacity.it)*

Rialto Bridge *(www.invenicetoday.com)*

Investigations and protection measures already realized:

The principal protection measures regard:

- Regeneration and preservation of wood foundation of buildings using EUROBOR method.
- Protection and reinforcement works on foundations giving directly onto quays and canals.

It has been realized an important analysis of the static condition of St. Mark's Basilica. The investigation program includes: topographic surveys, geotechnical investigation and foundation surveys, analysis of the mechanical characteristics of the masonry structures, sonic tomography and flat jack tests for the measurement of the state of stress and the determination of deformability characteristics.

S. Giorgio Church *(www.invenicetoday.com)*

Supplementary information:

Venice is irregular in plan, being built on 117 islands of various shapes and sizes. The city was built at Roman time. Venice and the lagoon was inserted in the UNESCO World Heritage List in 1987.

References on studies already done:

AA.VV. (1983) "Laguna, fiumi, lidi: cinque secoli di gestione delle acque nelle Venezie". Atti del Convegno indetto dal Magistrato delle Acque di Venezia. 926 pp.

COLOMBO P. e COLLESELLI F. (1996) "Preservation problems in historical and artistic monuments of Venice". Proc. Inern. Symp. "Geotech. Eng. For the preservation of Monuments and historic sites" Naples 3-4 October 1996, pag. 435-444.

ROSSI C., ROSSI P.P. e VIO E. (1996) "Monitoring system of St. Mark's Basilica in Venice: analysis and interpretation of the data". Proc. Inern. Symp. "Geotech. Eng. For the preservation of Monuments and historic sites" Naples 3-4 October 1996, pag. 373-385.