Introduction

These proceedings comprise 94 papers presented at the Eighth International Symposium on Land Subsidence (EISOLS) convened at the National Autonomous University of Mexico (Universidad Nacional Autonoma de Mexico, UNAM), Santiago de Querétaro, 17–22 October 2010. The papers and abstracts cover international science and social issues related to land subsidence, associated hazards and the role of natural resources development. In addition to these papers, another score of presentations were given in oral and poster sessions during the symposium. Abstracts of those presentations are available at: http://www.geociencias.unam.mx/geociencias/difusion/publicaciones.html.

Land subsidence, simply defined, is a gradual or sudden lowering of the Earth’s surface. The causes, both natural and anthropogenic, are many. Some of the natural processes include compaction, dissolution of relatively soluble subsurface material (sinkholes), underground erosion (piping), lateral flow, oxidation of organic soils, thawing permafrost, natural consolidation, hydrocompaction of dry unconsolidated deposits, and deep-seated volcanic and tectonic activity. These processes often are accelerated or amplified by anthropogenic factors such as excavation (mining), surface mechanical loading, drainage of wetlands, redirected or focused surface-water drainage and groundwater infiltration, and the extraction of subsurface fluids (groundwater, oil and gas).

Subsidence is a global phenomenon but the consequences and their remediation generally are local. Because of its global prevalence, and as much of the subsidence is related to hydrological processes affected by human development of local land and water resources, “Land Subsidence” was included in the UNESCO programme of the International Hydrological Decade, 1965–1974. During the Decade, UNESCO organized the 1st International Symposium on Land Subsidence in Tokyo in 1969. In 1975 land subsidence was retained under the framework of the International Hydrological Programme (IHP) as subproject 8.4 “Investigation of Land Subsidence due to Groundwater Exploitation”, and UNESCO formed the associated Working Group on Land Subsidence. The first Working Group, of which Laura Carbognin is the only original member still active in the present group, was chaired by the late Joe Poland, USA (affectionately referred to as “Mr Land Subsidence” and the “Saviour of Venice”), and comprised the late Soki Yamamoto, Japan, German Figueroa Vega, Mexico, the late José da Costa, UNESCO, and Ivan A. Johnson, USA, past chairman and present honorary member. The first goal of the UNESCO Working Group was to produce a guidebook to serve engineers, geologists and hydrologists confronting land subsidence problems, particularly in developing countries. The volume1 was published by UNESCO in 1984, and since then the UNESCO Working Group has become the recognized leader in promoting global land subsidence studies, and collaborating with other international scientific organizations to coordinate and host international symposia on land subsidence about every five years.

Since the 1st International Symposium on Land Subsidence, six more international symposia on land subsidence have been convened through cooperation of UNESCO with the International Association of Hydrological Sciences (IAHS), and several other agencies and organizations. The proceedings of each of the symposia comprise numerous scientific papers covering the various types of subsidence identified throughout the world2,3,4,5,6,7,8. The

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proceedings constitute a rich source of research and case studies on subsidence attributed to anthropogenic and natural processes.

The EISOLS proceedings build on the previous symposia proceedings by contributing new relevant research, case studies and experience emanating from the diverse and important land subsidence studies in Mexico and throughout the world. The relation of fracturing (earth fissures and surface faults) to sediment compaction and subsidence is complex and an important area of developing research in Mexico, Latin America and globally. The analysis of these phenomena requires an interdisciplinary approach to improve understanding of the triggering factors, failure modes and propagation processes of fracturing. Geologists, geophysicists, hydrologists, geotechnical and geomechanical engineers, other scientists, resource managers and stakeholders participated in the symposium and contributed papers describing the development of new techniques for monitoring, analysis, interpretation and prediction of subsidence and/or related fracturing processes—an emphasis of EISOLS.

In conjunction with EISOLS, three peripheral technical meetings were convened to focus on Mexican subsidence-related issues: (1) Workshop on Land Subsidence and Geotechnical Engineering, sponsored by the Mexican Geotechnical Association, ISSMGE Technical Committee 214, Foundation Engineering for Difficult Soft Soil Conditions; (2) Water Management Agencies Round Table, co-organized by CONAGUA (Comision Nacional del Agua), CEA Querétaro (Comision Estatal del Agua en Querétaro) and COTAS (Comites Tecnicos de Agua Subterranea); and (3) Scientific Consultants’ Presentations—case studies from companies working with remedial measures for foundations, constructions affected by ground fracturing, refilling of fractures, geological, geophysical, hydrogeological and geotechnical studies related to land subsidence processes. Papers from these technical meetings will be published in a forthcoming (2011) Special Issue on Land Subsidence, in the Boletin de la Sociedad Geologica Mexicana.

The EISOLS proceedings papers are organized in sections covering subsidence topics related to (1) Earth fissures, fracturing, and faulting; (2) Modelling; (3) Geological and geomechanical processes; (4) Monitoring; (5) Social and economic impacts and their incorporation into resources management strategies; and (6) Subsurface fluids withdrawal. We invite you to explore these proceedings, the previous ones, and the references cited therein, and hope and trust you will find this compilation useful.

The UNESCO Working Group on Land Subsidence

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