PREFACE

Inland Acid Sulfate Soils (ASS) form under a wide range of environmental conditions, from freshwater to saline environments in inland settings, through mechanisms involving an amazing diversity of soil and water conditions. The extent of their occurrence in Australia has only recently become apparent due to the drying of inland wetland and river systems in the current drought (2006 to 2008). In contrast, there is a much larger amount of published information for "coastal ASS" that have formed in modern-day coastal zones (i.e. those areas landwards of the coastal waters influenced by processes or activities that affect the coast and its values - as defined by NRMMC 2006). Hence, we define Inland ASS as those ASS, which occur inland of modern-day coastal zones. Inland ASS, provide an impressive array of management challenges and opportunities (e.g. mineral exploration). The publication of this monograph is contemporaneous with new occurrences and discoveries of inland ASS that have led to increasing interest in the soil-regolith zone as well as in wider environmental concerns. Investigations of inland ASS are greatly enhanced by prior knowledge of soils, regolith, wetland ecology, aquatic systems and detailed biogeochemistry. A plethora of recent studies of inland ASS across Australia and in some other parts of the world (e.g. Iraq and Brunei) have documented their distribution, properties, and significance. Some have resulted in general soil-landscape conceptual models that synthesise their biogeochemical and mineralogical characteristics and weathering histories. Unfortunately, much of this information is hidden in widely-scattered sources, both published and unpublished, that encompass a range of disciplines.

This CRC LEME (Cooperative Centre for Landscape Environments and Mineral Exploration) Thematic Volume or monograph (published here as a CRC LEME Open File Report) entitled: "Inland Acid Sulfate Soil Systems Across Australia" represents a first step in drawing together much of this scattered multidisciplinary literature. The monograph aims to provide the framework for an up-to-date overview of fundamental principles, methods and importance of inland ASS to environmental, mineral exploration and policy issues across Australia.

This monograph presents the first compilation of ASS studies for inland environments in Australia showcasing a range of important investigations completed by CRC LEME, CSIRO Land and Water, Universities, State and Territory Departments, geological surveys and industry. The monograph effectively integrates and summarises research outcomes on inland ASS, covering soil and regolith science, geology, mineralogy, biogeochemistry, hydrology, policy and the assessment of potential natural hazards in the soil-regolith-water environment.
The introductory or overview chapters feature: (i) definitions of inland ASS types and ASS materials, (ii) general soil-landscape conceptual models emphasising their biogeochemical and mineralogical characteristics and weathering histories, (iii) risk assessment procedures and recommendations on field sampling and laboratory analytical methods, (iv) mapping procedures and distribution, (v) groundwater and surface water issues, (vi) processes and frameworks to control and manage environmental issues (soil degradation, water quality, toxic gasses, greenhouse gasses and climate change), (vii) implications for mineral exploration and forensic science, (viii) policy, strategic planning, communication and training issues. This is followed by a number of case studies mainly from across Australia, which highlight the variety of inland ASS and the environments in which they form.

The monograph will be a valuable resource for:
- soil, regolith and environmental scientists
- natural resource managers
- students
- anyone with an interest in Australia's unique environment
- mineral exploration
- farmers

The monograph fulfils the following key functions, each of which will be explained further:

It is the first comprehensive reference on the distribution, properties and management of inland ASS.

It is the first major compilation of case histories of inland ASS processes in different geochemical/geomorphic, mineralised and land use settings.

It provides both public and government organisations with past and new information on the distribution,

properties and significance of inland ASS in Australia, as a major environmental issue for land and water degradation.

It makes recommendations on appropriate sampling, mapping and analytical procedures for inland ASS, including sampling and chemical analysis procedures (e.g. soil pH before and after hydrogen peroxide treatment, soil incubation, acid base accounting and X-ray diffraction) and data interpretation.

It contributes to changes in government agency and industry practice to assess inland ASS (i.e. description, sampling, characterisation, analyses and mapping) for improved environmental risk assessment and management strategies.

It develops national and some international understanding of the spatial distribution and biogeochemical processes leading to inland ASS formation.

It provides recommendations on appropriate mineral exploration procedures embedded in the inland ASS conceptual process models.

It contributes to State, national and international regulatory guidelines and frameworks to control and manage inland ASS in the environment.

To the knowledge of the editors there is currently no single work or book on the subject of inland ASS. Added to this, there recently has been a mini revolution in the way inland ASS are viewed. This work in progress will continue, especially taking into account the vast number of studies being undertaken across Australia in the current drought, with the aim of producing the definitive international book on inland Acid Sulfate Soils.

REFERENCE

NRMMC 2006 Natural Resource Management Ministerial Council (2006) – Glossary of terms Page 50. Commonwealth of Australia Department of the Environment and Heritage, Canberra, ACT. National Cooperative Approach to Integrated Coastal Zone Management: Framework Implementation Plan. ISBN 0642550514.

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