

Shark Bay Carbonates after the Pioneers: some Current Research

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Since the initial sedimentological studies of Shark Bay in the 1960s to 70s (by Logan et al, Read, Hagan, Hoffman, Davies and others) on hypersaline stromatolites and microbial tidal flats, seagrass banks, calcrete, and hypersaline basin evolution the area was established as a World Heritage precinct with high conservation status and remains an important asset for all with an interest in carbonate sediments and diagenesis. Ongoing research has included studies by astrobiologists, ecologists and geologists (eg. Walter, Burns, Goh, Allen, & Neilan, McNamara). Sedimentological research has centred on a number of separate studies, notably by Playford, 1976, 1979, 1990; Burne, & Moore, 1987; Kennard & James, 1986; Awrick & Riding, 1988; Reid et al, 2003 and several others.

The recognition of the reservoir significance of coquinas and microbialites in recently discovered fields (eg. Santos and Campos Basins, Brazil) has renewed interest in the analogue potential of similar facies in Shark Bay, with the development of current and new research themes including:

- Microbial mat facies and fabrics, chemistry, organic composition and microbial communities,
- Subtidal microbial structures: origin, occurrence, distribution and growth history,
- Coquina ridge morphology, facies, structures, chronologic record and evolution.

The subtidal study has allowed a re-evaluation of the Shark Bay stromatolite model. Based on the improved knowledge of the nature and distribution of Shark Bay microbial deposits a revised facies model has been constructed and is characterized by relatively extensive and prolific activity of bacteria, during the last 2000 years, producing microbialites that are exposed in the supratidal zone and are progressively colonizing the subtidal zone as a consequence of sea level fall, although evidence of recolonization observed on the intertidal zone points to a recent short marine transgression.

With the discovery of widespread subtidal microbialites the Shark Bay intertidal stromatolite model was re-evaluated after initial reporting of mainly intertidal forms. Establishing the widespread nature and distribution of subtidal microbialites enhances Shark Bay's applicability as an analogue for ancient systems.

A forty year climate drying in southwest Australia and interaction with the cyclone (hurricane) regime which impacts the semi-arid Shark Bay region has raised questions for marine park managers concerning potential future climate trends and their impact on World Heritage assets. Maintenance of the hypersaline system in

areas such as Hamelin Pool is dependent upon evaporation (currently 10x precipitation), runoff input (dependent on low winter rains but also cyclone intensity and frequency) and tidal exchange across the northern Faure barrier channel-bank complex, such that hydrodynamic circulation is also dependent on future sea levels, and a research team is evaluating potential future change from a management viewpoint. Additionally, an arid delta juxtaposed with the channel-bank complex provides a facies association of potential analogue significance for regional hydrocarbon explorers.