

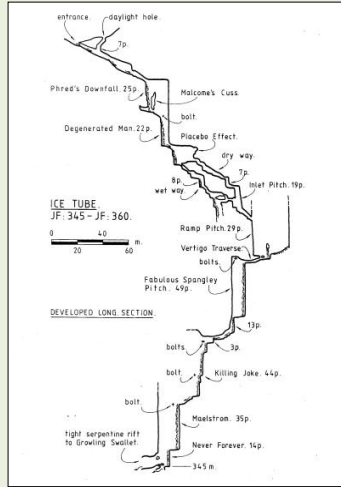
ECOSYSTEM SERVICES IN KARST AND CONDUIT GROUNDWATER SYSTEMS



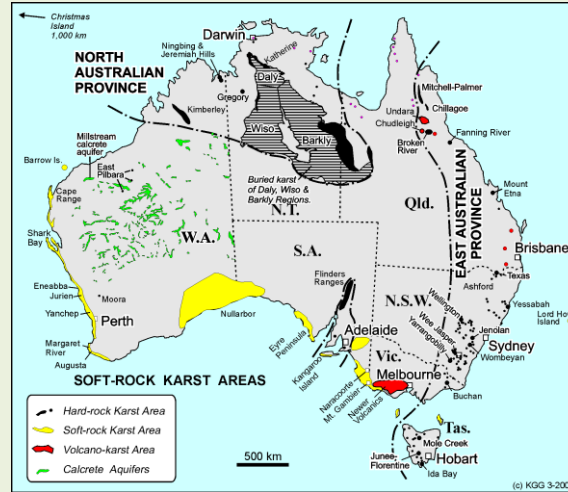
Ian Houshold
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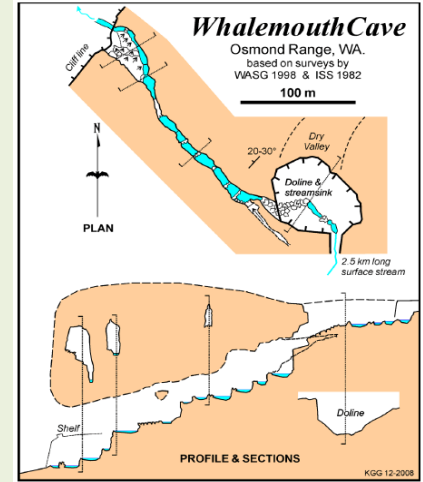
KARST AND CONDUIT BASED SYSTEMS



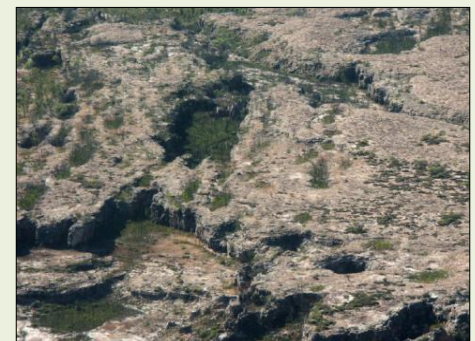
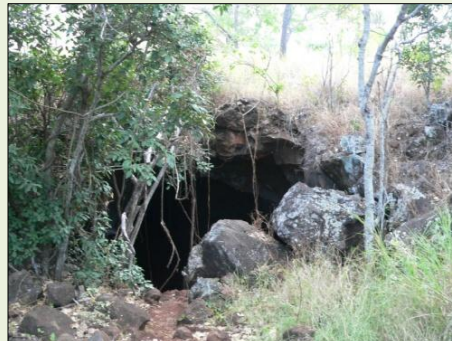
Carbonate



Basalt



Sandstone



KARST ECOSYSTEM SERVICES

<p>Provisioning</p>	<p>Water supply – domestic, agricultural, industrial</p> <p>Underground dam (grout curtain) for water supply and hydro power, Dubrovnik, Croatia</p>	
<p>Supporting</p>	<p>Nutrient cycling</p> <p>Supporting surface and subterranean GDE's</p> <p>Supporting biodiversity and geodiversity</p> <p>Supporting land surface stability</p>	
<p>Regulating</p>	<p>Wetland and lake levels</p> <p>Springs and river flows</p> <p>Soil moisture levels</p>	
<p>Cultural</p>	<p>Science/education</p> <p>Spiritual</p> <p>Tourism</p>	

Karst underlies 15% of the Earth's surface

Home to approx 1 billion people

25% of the world's population relies on karst groundwater

Very high connectivity, important **vadose and phreatic processes**

THE VADOSE ZONE



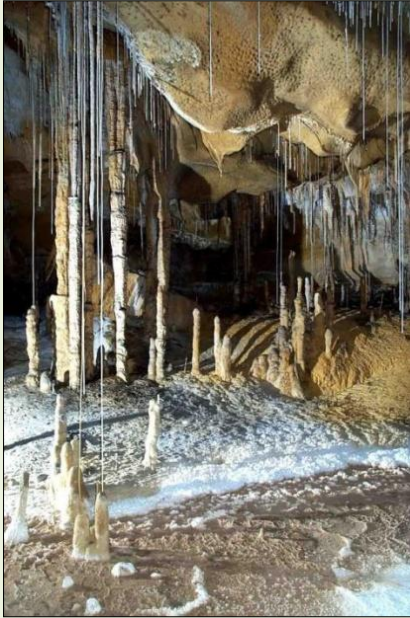
Vadose percolation, streams and pools – biodiversity support



- Karst most accessible of all vadose zones
- May be hundreds of metres thick
- Significant biodiversity and biomass
- Poor or inconsistent legislated definition of groundwater zones
- Difficulty planning or managing vadose ecosystem services
- What are the implications of karst research for vadose fractured and porous media?

GEODIVERSITY AND GEOSYSTEM SERVICES

“The range or diversity of bedrock, geomorphological (landform) and soil features, assemblages, systems and processes”



Underground streamflow, percolation water and phreatic flows –
geodiversity support

Groundwater and geodiversity in other contexts?
Geosystem services?

KARST POLICY, TOURISM AND EDUCATION



GDE management policy in Australia pioneered through karst conservation issues 1964 – 1992

- Colong (NSW)
- Yessabah (NSW)
- Mt Etna (Qld)
- Precipitous Bluff, Exit Cave (Tas)

Public education key to development and implementation of good policy

Australian tourist cave visitation exceeds 1 000 000 per year - environmental and karst management now basic interpretation

Interpret more generally groundwater-surface water interaction and ecosystem services from groundwater?



Vadose zone
Geodiversity
Geosystem services
Education through tourism