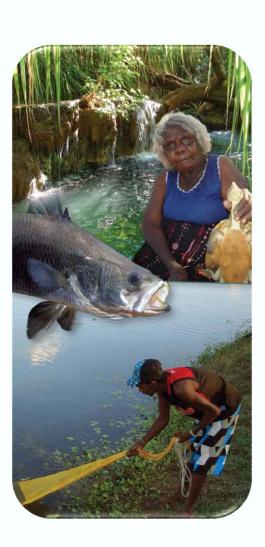
- What lessons have you learned, and/or what approaches can you share in relation to using ecological, economic, hydrogeological or special-purpose ecosystem services models for ecosystem services?
- 1. Not all GDEs are equal!
  - Need for understanding hydrogeological controls
- Many good tools/approaches for measuring and modeling at various scales
  - Environmental tracers, geophysics cf. hydraulic methods
- 3. Alternative knowledge systems provide significant opportunities for understanding systems
  - e.g., indigenous knowledge and cultural values



- What challenges have you experienced in measuring, modeling and/or valuing water ecosystem services?
- 1. Scale of measurement rarely appropriate for scale of management (e.g., baseflow systems).
- 2. Seasonality of flow regimes
  - Access limitations, representative of critical conditions?
- 3. Comparison of different knowledge systems
- Modeling tools don't always capture level of complexity required for predicting change
- 5. Uncertainty shouldn't prevent progress!





 What data is currently available for groundwater ecosystem services? What data is not available, but is needed?

#### Available

- Mapping of current/historical GDEs (e.g., atlas)
- Case studies of groundwater flux estimation

### Needed

- Ecosystem responses to changes in hydrological and/or biogeochemical regimes
- Cumulative (regional) impacts of groundwater extraction on GDEs, and associated time lags







 What steps should we be taking to improve measurement and valuation of groundwater ecosystem services?

#### Measurement

- 1. Multi-disciplinary team approaches
  - bridge the gap between ecologists and hydrogeologists, etc.
- 2. Longer-term investment in monitoring and evaluation projects
  - 1-2 years inadequate

#### Valuation

- 3. Education and community awareness of non-extractive services
- 4. Economic valuation of ES
  - Provision of food/water, regulating services, cultural requirements, ecosystem support etc.

