# Accounting for ecosystem services and values in South Africa

Jane Turpie
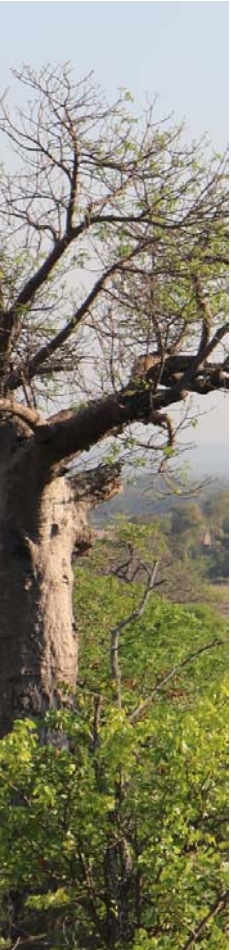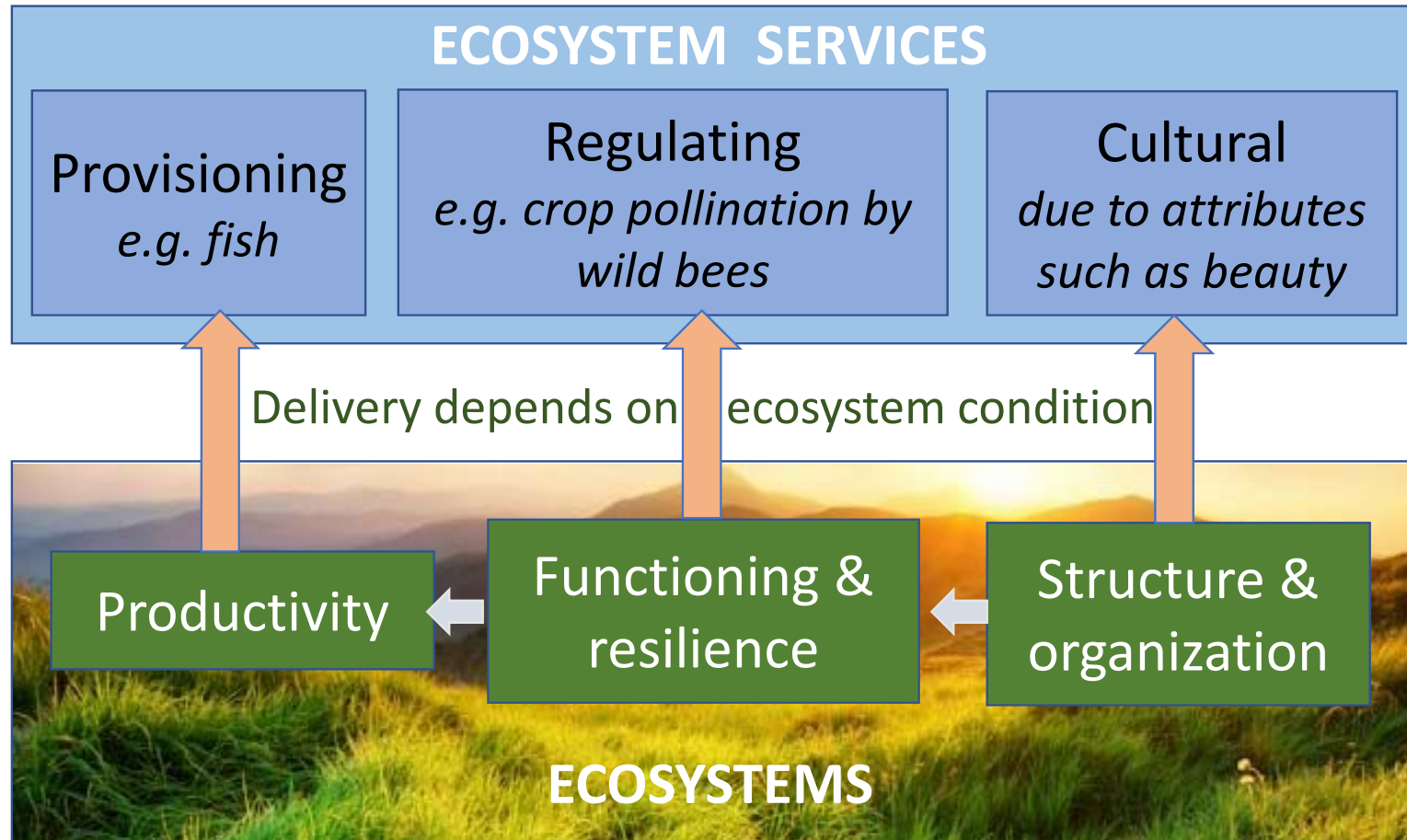
Consultant to UN and SANBI

NCA&VES Project

# Ecosystem services

# Ecosystem services

- **Provisioning**
  - Foods, materials and energy sources harvested from natural systems, reared animal and cultivated systems

  Abiotic resources excluded, e.g. minerals, water
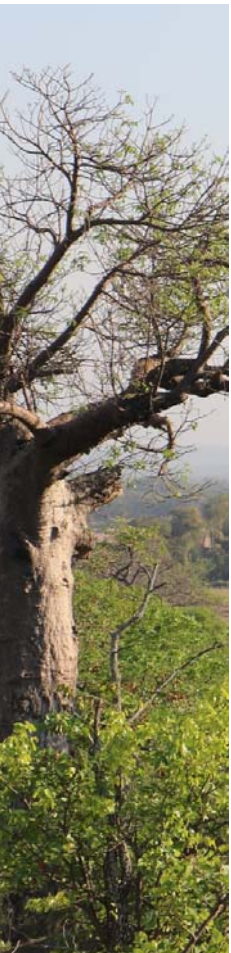
- **Cultural**
  - Recreational/spiritual fulfilment associated with active or passive use of ecosystems

- **Regulating e.g.:**
  - Flow regulation
  - Water quality amelioration
  - Sediment retention
  - Pollination of crops
  - Nursery value
  - Carbon sequestration

  SEEA not adopting any particular classification system for now

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# Ecosystem services and benefits

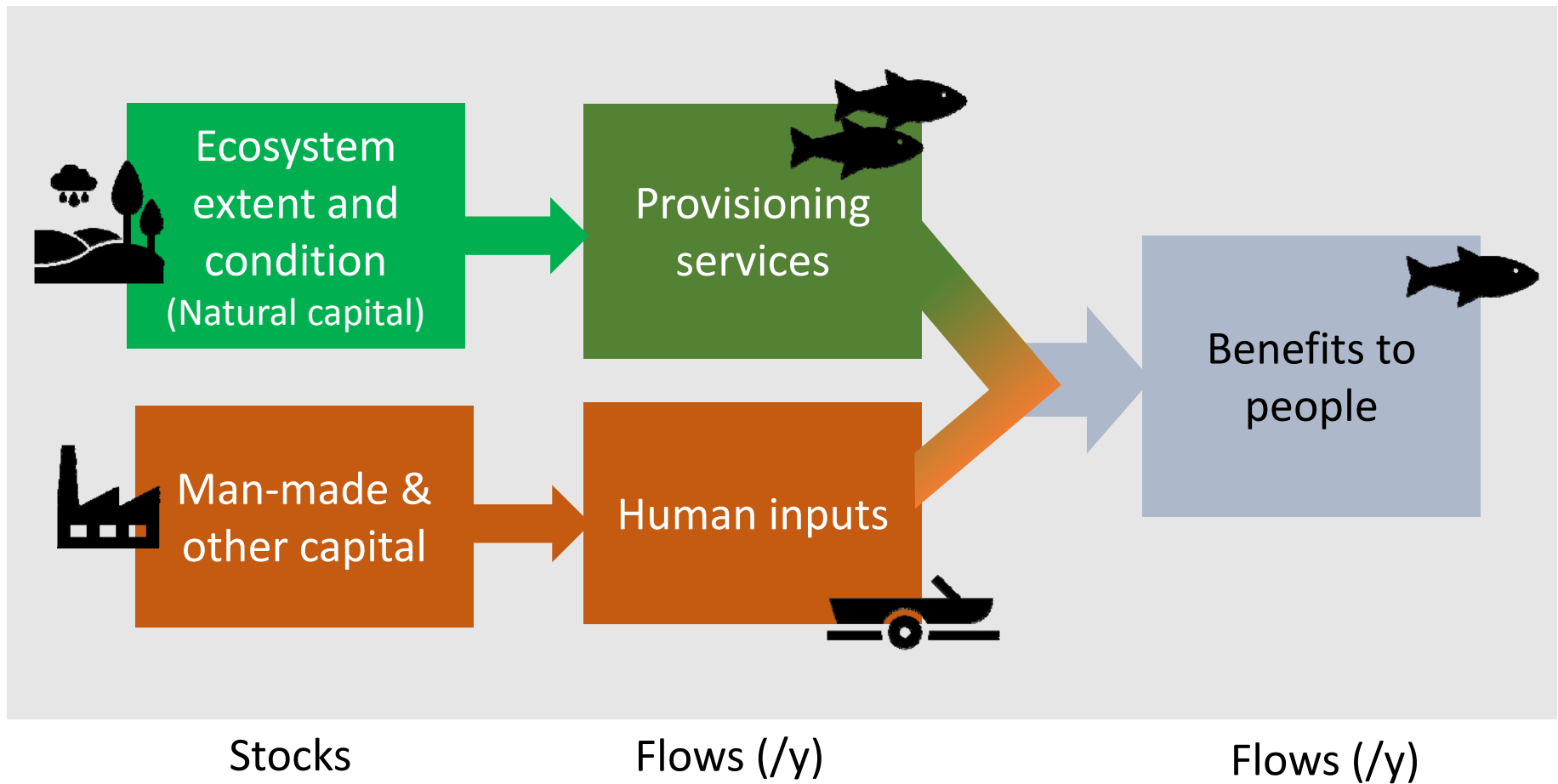- **Ecosystem services are the _contributions_ of ecosystems to _benefits_ enjoyed by _people_**

- Many of these benefits are valued in SNA, some not
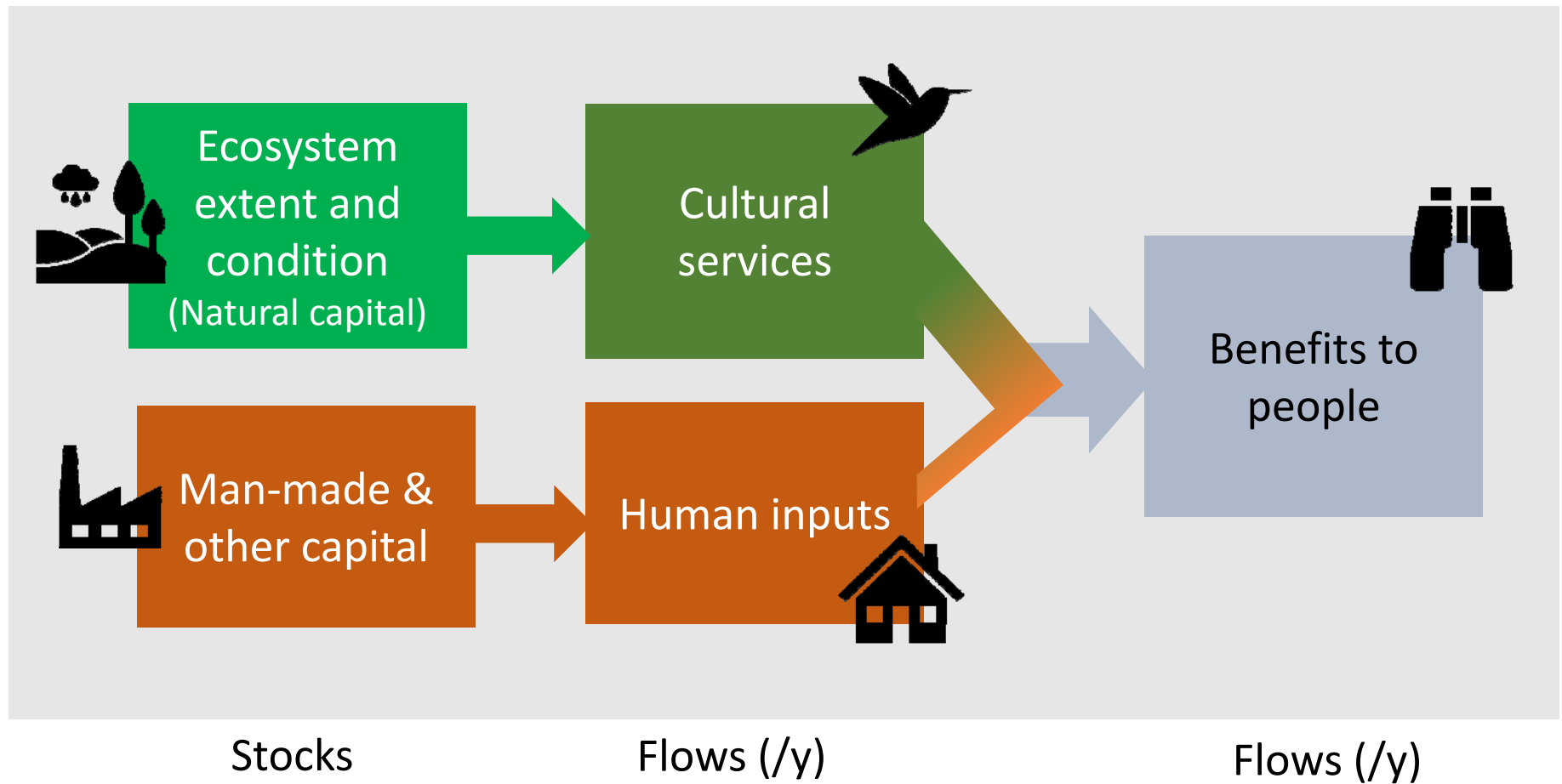
  ✔ e.g. Fisheries Agriculture Tourism    e.g. Local recreation ✘

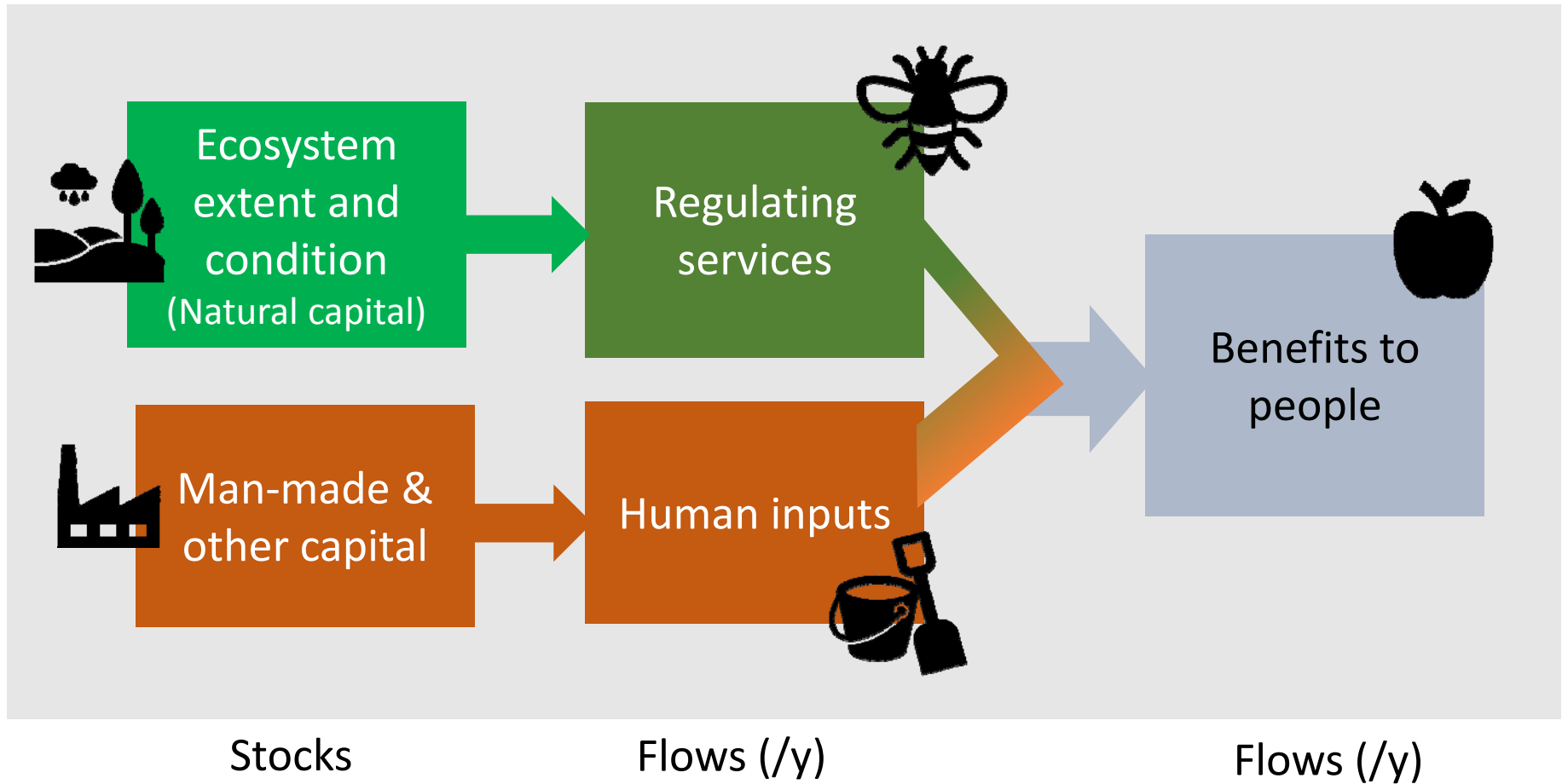- Ecosystem contribution not explicit

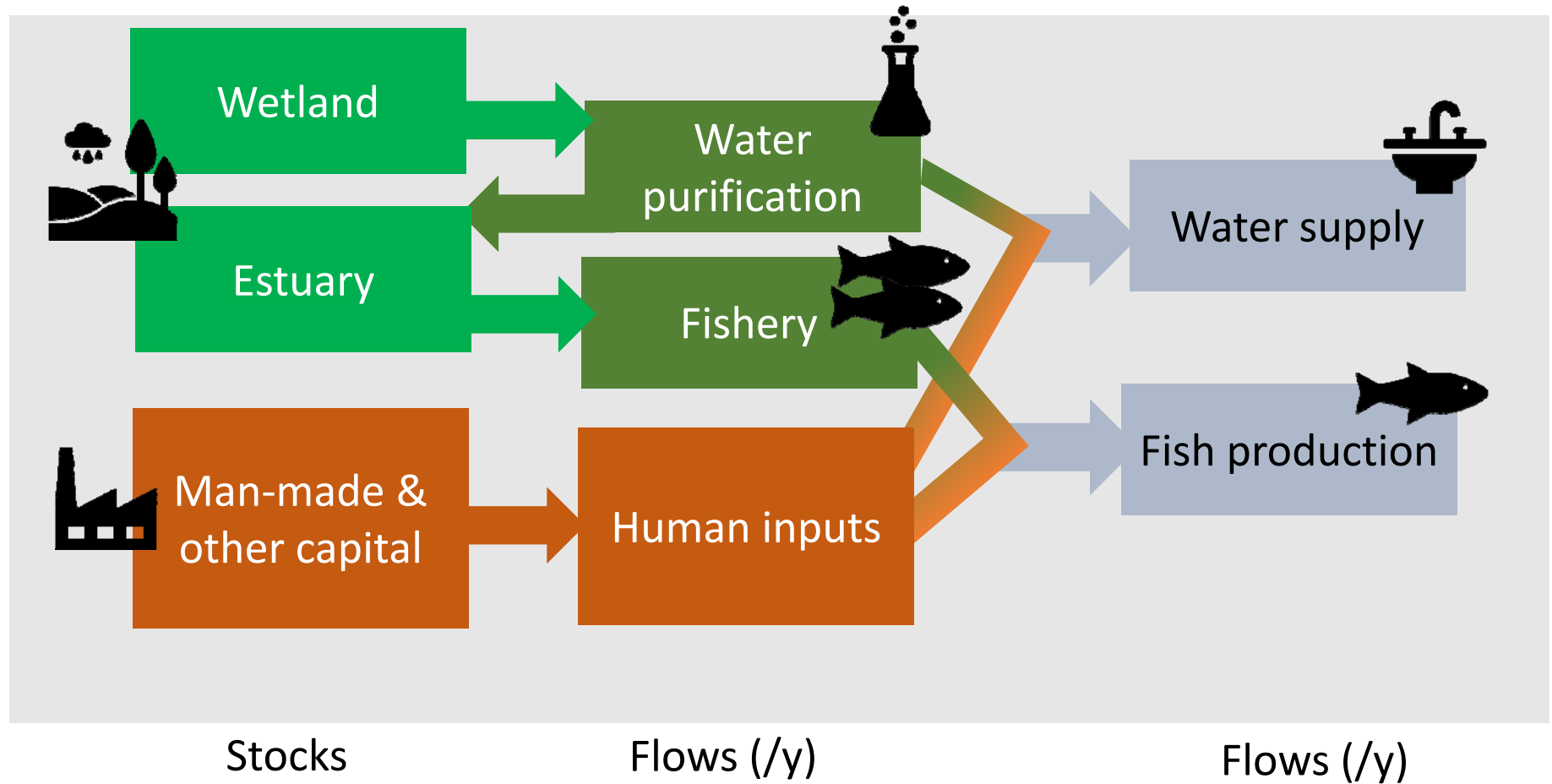# Benefits are derived from combined inputs



Ecosystem extent and condition (Natural capital) → Provisioning services

Man-made & other capital → Human inputs

Benefits to people

Stocks      Flows (/y)      Flows (/y)

# Benefits are derived from combined inputs



Ecosystem extent and condition (Natural capital)

Cultural services

Man-made & other capital

Human inputs

Benefits to people

Stocks

Flows (/y)

Flows (/y)

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# Benefits are derived from combined inputs



Ecosystem extent and condition (Natural capital) → Regulating services

Man-made & other capital → Human inputs

Regulating services + Human inputs → Benefits to people

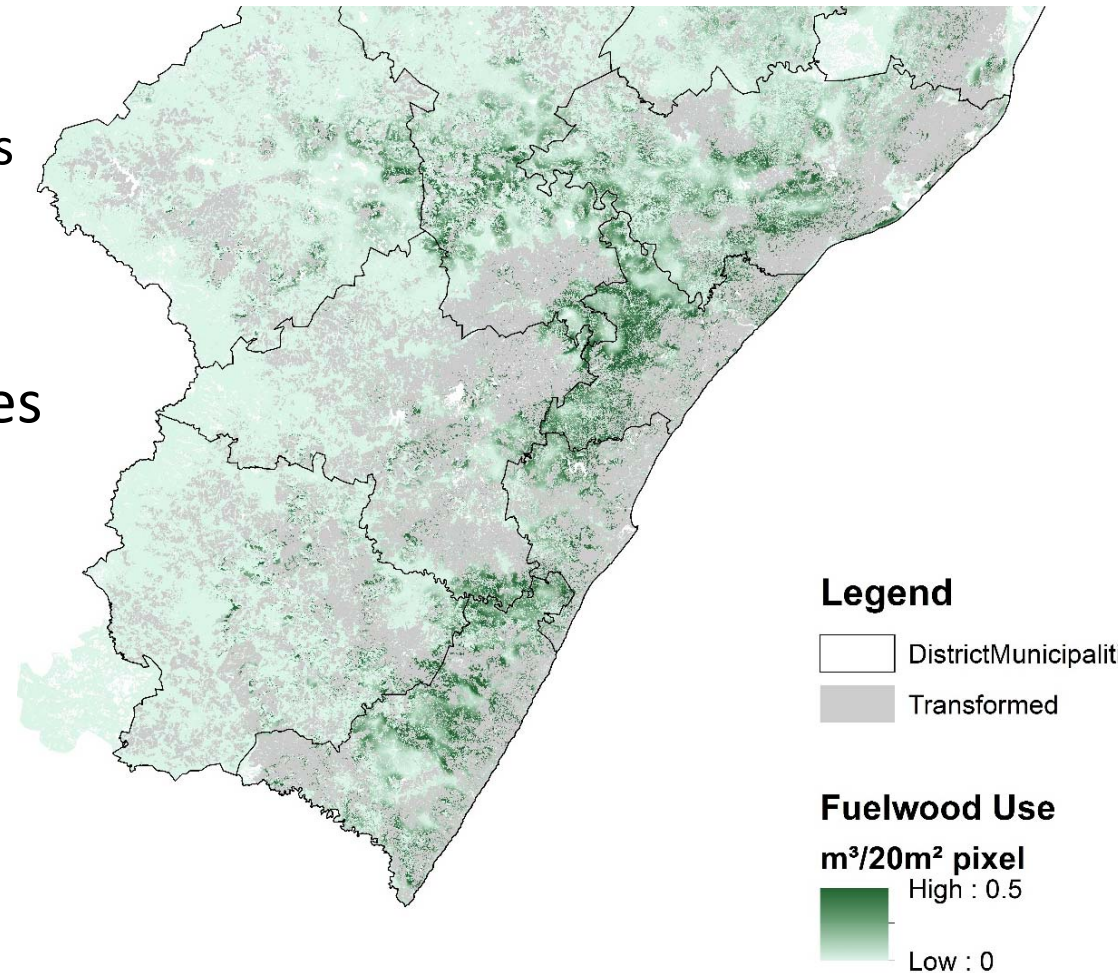Stocks          Flows (/y)          Flows (/y)

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# Intermediate vs final services

# Accounting for ecosystem services and value

- Quantify ecosystem services
  - Physical, monetary contributions
- Map the origin of values
  - Extrapolate or disaggregate
- Estimate ecosystem asset values
  - Much like farm prices/ha reflect the value of production
- Tabulate stocks and flows
- Track changes over time
  - Link changes in wellbeing to changes in ecosystems

**Legend**

| | DistrictMunicipaliti |
| | Transformed |

**Fuelwood Use**
**m³/20m² pixel**

High : 0.5

Low : 0

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# Primary (site-level) valuation

| Division | Type of methods | Comments |
|---|---|---|
| Provisioning services | • QxP-C<br>• Residual value<br>• Production functions | • Survey/monitoring data |
| Regulating services | • Damage costs avoided<br>• Replacement costs<br>• Cost functions<br>• Market values (rare) | • Biophysical aspects can be challenging |
| Cultural services | • Market-based methods;<br>• Revealed preference methods (modified) | • Complex econometrics<br>• Challenges associated with non-market, intangible values normally measured in terms of WTP, CS |
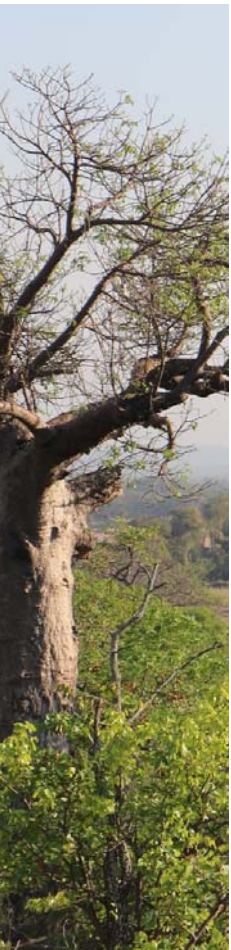
# Mapping value to ecosystem assets

- Estimation/spatial extrapolation of value based on values from localised studies
  - **Unit transfer** = using a single estimate x area (not advisable)
  - **Function transfer** = allows modeller to vary the relevant parameters affecting supply and demand (provided source model is suitably designed)
  - **Meta-analysis** = involves generating a source model based on analysis of multiple estimates
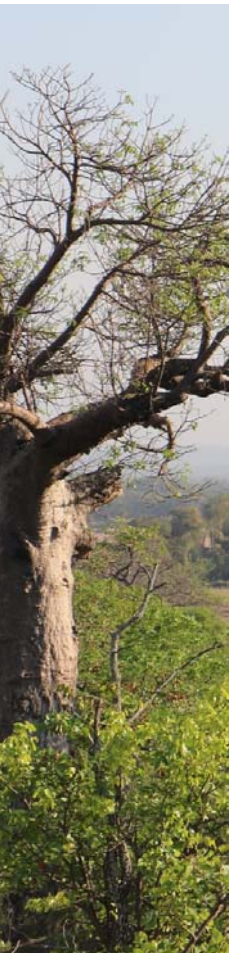- Will be common practice in NCA

Both supply and demand vary geographically
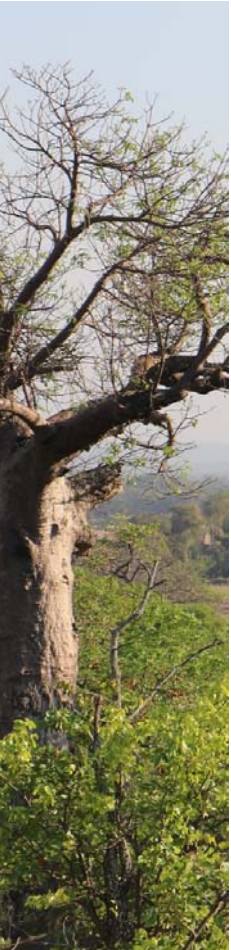
# For example

- **Amenity** value of green urban space is reflected in **property value**

- **Premium** can be isolated through statistical analysis
  - Controlling for property and other neighbourhood characteristics

- Then aggregated and mapped back to green space areas to determine their value/ha
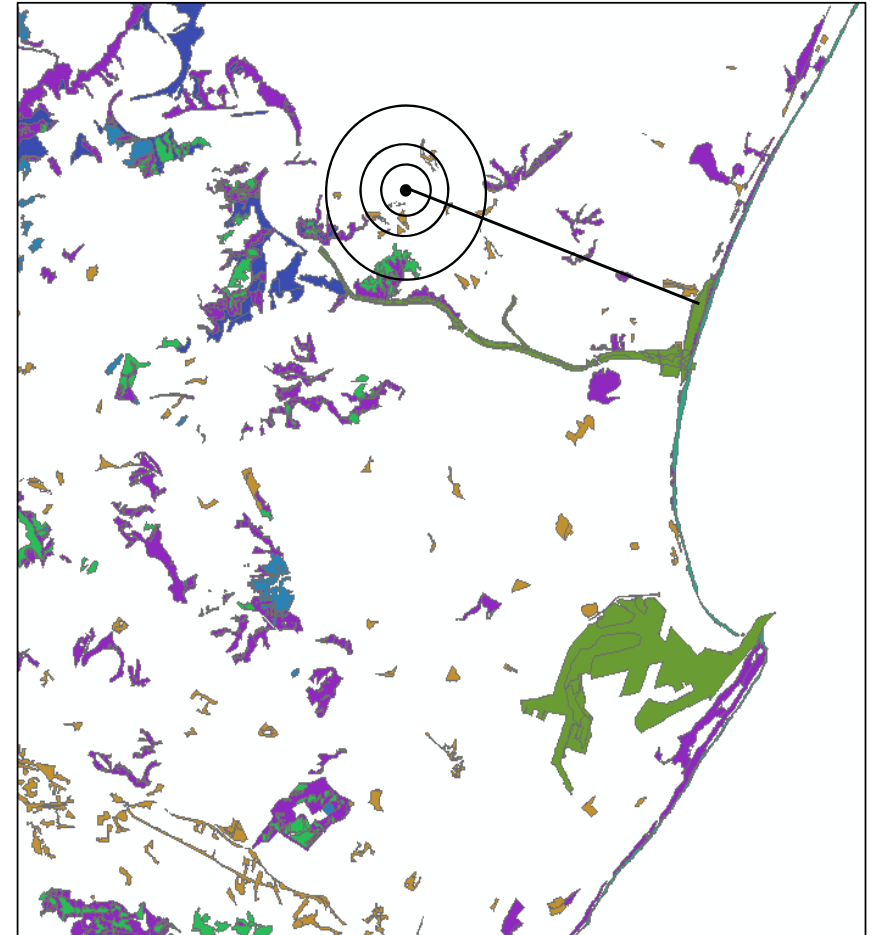
# Valuing ecosystem services in SA

- Numerous ecological and valuation studies in SA offer a good starting point
- Some of this synthesised in a a rapid national scale study 2017
- More work required to improve estimates of value and their spatial resolution
  - fuller coverage of services
  - measures compatible with SNA
- NCA&VES project – provincial scale pilot study (KZN)

# Main challenges

- **Consistency** in the definition and estimation of ecosystem services and values in NCA
  - Ecologists, economists and accountants speak different languages,
  - Even amongst themselves…
- **Data** - need large amounts at national scale, at high spatial resolution
- **Capacity** - complex dynamic biophysical modelling, econometrics, remote sensing, programming and geospatial statistics
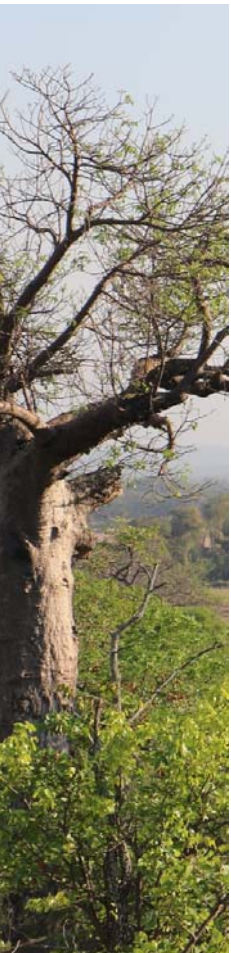
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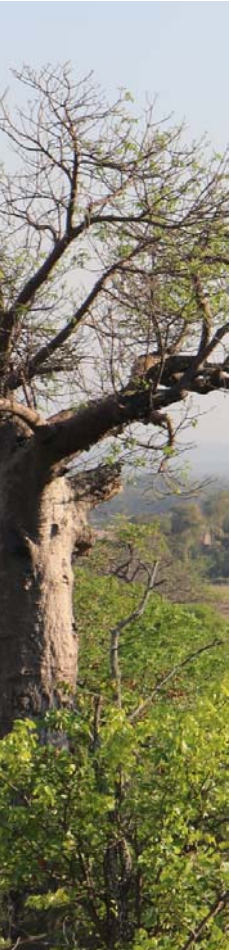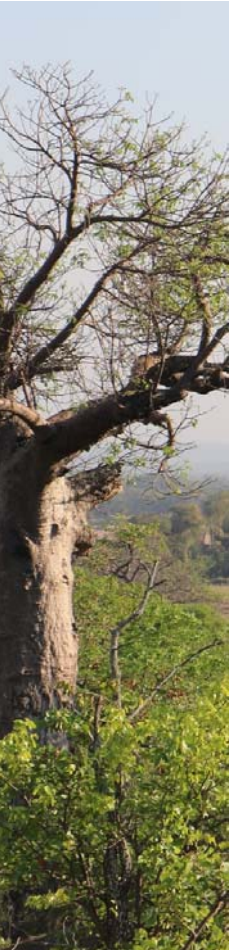
# Thank you

# Data collation

**Databases**
- Household livelihood survey data
- Agricultural census 2007 ++
- KZN & Park tourism statistics
- Tourism satellite accounts
- Property sales data
- KZN recreational and inshore fisheries data
- River & estuary RDM data
- All KZN water treatment plant monthly volumes & costs 2005-15
- Water quality detailed time series – nutrients, sediments, E. coli, NTU, chlorophyll a for KZN monitoring stations
- All KZN dam capacity and sediment monitoring data & dredging data
- All KZN flow monitoring data
- uMgeni detailed water accounts
- Design storm rainfall data for all KZN quaternaries
- Daily rainfall for selected stations

**Ecosystem services**
- Provisioning value – foods, materials, energy
- Livestock & game production
- Amenity value – visitor expenditure
- Amenity value – property premiums
- Refugia/Nursery areas
- WQ amelioration
- Erosion control
- Surface flows
- Groundwater recharge
- Flood attenuation
- Carbon storage

**Spatial data**
- Land tenure
- SA vegetation map
- Census @ subplace or mesozone
- Grazing capacity map
- Roads
- Panoramio/flickr data
- Crime statistics
- Google Earth
- Urban open space data
- Monthly & annual rainfall & temperature maps 2005-15
- 20m KZN land cover
- 30m DEM
- National IAP map
- National recharge map
- New humic soils map
- Buildings & structures
- National carbon map

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