Will diversity assist adaptability?

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Background

- Traditional fisheries management
  - Few, larger operators
  - Targeting one or a few species
  - Minimise effort shift between fisheries / areas

- Managing for adaptation
  - Diverse operation types
  - Targeting and marketing multiple species
  - Ability to shift effort between fisheries / areas
How does diversity assist adaptation?

- Case study:
  Queensland east-coast inshore finfish fishery (Australia)
  - “The Inshore Fishery”
How does diversity assist adaptation?

- **Case study:**
  
  Queensland east-coast inshore finfish fishery (Australia)
  
  - “The Inshore Fishery”
  - Inshore habitats
    - bays, creeks, estuaries
  - Production driven by rainfall and freshwater flow
    - variable year-to-year
How does diversity assist adaptation?

- **Case study:**
  
  Queensland east-coast inshore finfish fishery (Australia)
  
  - “The Inshore Fishery”
  
  - Commercial set net (~200 active vessels)
How does diversity assist adaptation?

• Case study:

Queensland east-coast inshore finfish fishery (Australia)
  – “The Inshore Fishery”
  – Commercial set net (~200 active vessels)
  – Charter line (230 vessels)
  – Multiple species
    – Main = barramundi
Case study

How does diversity assist adaptation?

- **Case study:**
  
  **Queensland east-coast inshore finfish fishery (Australia)**
  
  - “The Inshore Fishery”
  - Commercial net (~200 active vessels)
  - Charter line (230 vessels)
  - **Socio-economic indicators**
    
    - Monitor success of fisheries management goals
      
      - Including “DIVERSITY”
# Case study

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishing range</td>
<td>Furthest = 1,450 km</td>
</tr>
<tr>
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<td>45% &gt; 100 km</td>
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<tr>
<td>Target sp</td>
<td>40% Barramundi primary</td>
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<tr>
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<td>Multiple secondary</td>
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<td># fisheries</td>
<td>1 to 6;</td>
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<td>Average 28 years</td>
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## Case study

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<th>Charter</th>
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<tr>
<td>Fishing range</td>
<td>Furthest = 1,450 km 45% &gt; 100 km</td>
<td>Furthest = 1,705 km 30% &gt; 100 km</td>
</tr>
<tr>
<td>Target sp</td>
<td>40% Barramundi primary Multiple secondary</td>
<td>75% Barramundi primary 90% Barramundi as top 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very few secondary</td>
</tr>
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<td># fisheries</td>
<td>1 to 6; 7% solely inshore</td>
<td>1 to 2; 70% dependent on inshore</td>
</tr>
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<td>Experience</td>
<td>Average 28 years</td>
<td>8 yrs</td>
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- **Diverse**
- **Specialised**
Hypothetical scenario:
- Focusing on barramundi
- Increased water temperatures
- Sporadic rainfall in the north
  - no freshwater flow
- Barramundi move south
Hypothetical scenario:
- Focusing on barramundi
- Increased water temperatures
- Sporadic rainfall in the north
  - no freshwater flow
- Barramundi move south
- Disappear from Cairns north
- How do these fisheries react?
Hypothetical scenario:

- How do these fisheries react?

  Target species moves
  
  Follow fish
  - Yes
  - No

  Change species
  - Yes
  - No

  Change fisheries
  - Yes
  - No

  Leave the fishery
  - Yes
  - No
Commercial fishers

Hypothetical Target species moves

Follow fish  
Yes  No
Commercial fishers

Target species moves

Follow fish

Yes

No

45% range > 100 km

12% range > 500 km
Commercial fishers

Target species moves

Follow fish

Yes  No

45% range >100 km
12% range >500 km
Commercial fishers

Target species moves

Follow fish
- Yes (45%)
- No (55%)

Change species
- Yes
- No

All target and market multiple species
Whiting, bream, etc...
40% barramundi primary target
Commercial fishers

93% operate in multiple fisheries

Target species moves

Follow fish
- Yes 45%
- No 55%

Change species
- Yes 60%
- No 40%

Change fisheries
- Yes
- No
Charter fishers

Target species moves

Follow fish

Yes

No
Charter fishers

Target species moves

Follow fish

- Yes
- No

30% range >100 km
20% range >500 km
Hypothetical

Charter fishers

Target species moves
Follow fish: Yes
No

30% range >100 km
20% range >500 km
Charter fishers

Target species moves

Follow fish
- Yes: 30%
- No: 70%

Change species
- Yes
- No

25% have other main target...
75% barramundi is main target
90% barramundi top 3
Charter fishers

Target species moves

Follow fish
- Yes: 30%
- No: 70%

Change species
- Yes: 25%
- No: 75%

Change fisheries
- Yes: 30% access other fisheries
- No: 70% dependent on inshore
  Highly specialised vessels
Hypothetical

Charter fishers

Target species moves

Follow fish
Yes 30%
No 70%

Change species
Yes 35%
No 65%

Change fisheries
Yes 30%
No 70%

Leave fishery
Yes
No

Young (~40 years)
High education
Short time in fishery
Other experience
Other sources of HH income

SOCIAL RESILIENCE
• Charter sector unlikely to adapt
  – unable to restructure
  – But *socially* resilient
• To keep a fishery going, need *socio-ecological* resilience
  – Commercial inshore fishers – yes
    • Longevity of experience
    • Variable environment
    • Learn from them?
  – Diversity
    • Harder to manage – issues of effort shift
    • Need to find way to:
      – keep *diversity* = *adaptive capacity*
      – without compromising sustainability

Conclusion
Questions?

Thanks to all the Queensland fishers who put up with some very long surveys!
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And thanks to Andrew for many thoughtful discussions.

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