

# Artisanal fishing on the Kenya coast: what are the impacts?

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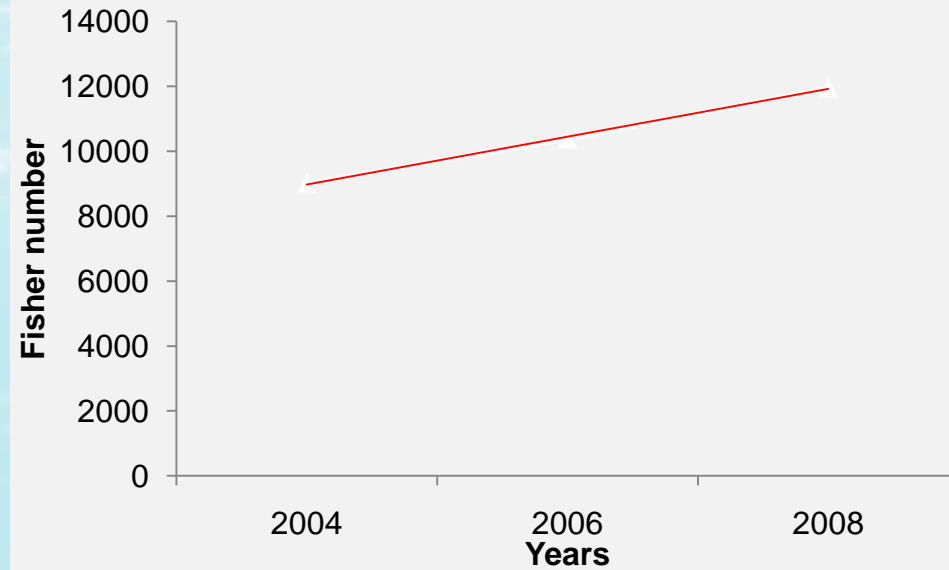


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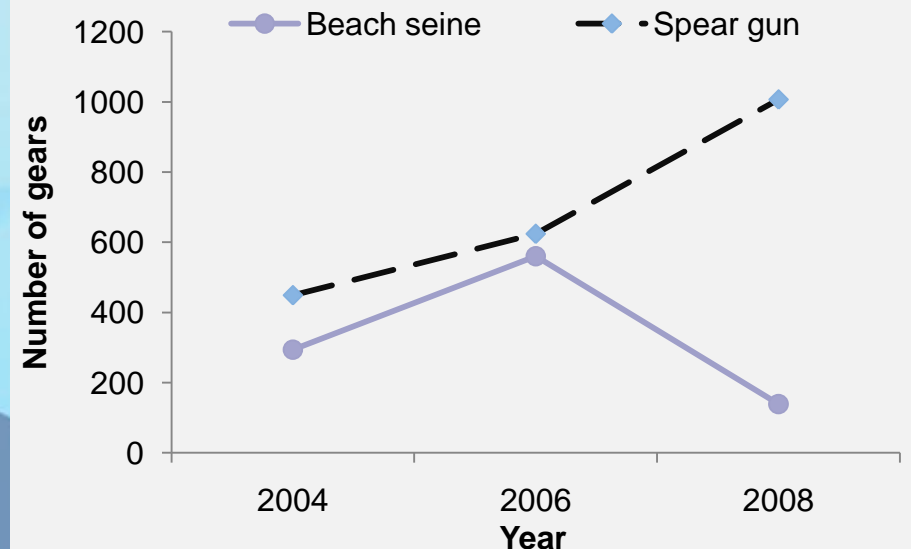
# Introduction

- Population on East African coast >20 million people.
- Expected to grow to 39 million people by 2014.
- Most dependent on marine resources leading to issues of:
  - overfishing
  - destructive and illegal fishing
- Management difficult
  - Multispecies
  - Multi gear(14 artisanal gears)
- Food insecurity

Artisanal fishers Kenyan Coast



Illegal gears (FiD Act)




Source FiD Frame survey 2004, 2006 & 2008


# Hypotheses & rationale

- Artisanal fishery catch rates are in decline and stocks are overfished
- Populations of reef fish are declining which reflect the declining trend in fishery catch rates
- The artisanal gears used have varying destructive aspects which are also difficult to manage
- Examined whether current government regulations are suitable for the different gears

# Methods

 Review of published papers and some unpublished reports on fishing to extract key variables

- CPUE - measure of the state of each fishery
- Gear catch composition – species contributing 65% - 75%
- Fish population abundance - UVC surveys


 An 8 year CORDIO dataset (1998-2006) on artisanal fisheries and 2 year UVC estimates in Diani-Chale used to supplement data from the location.

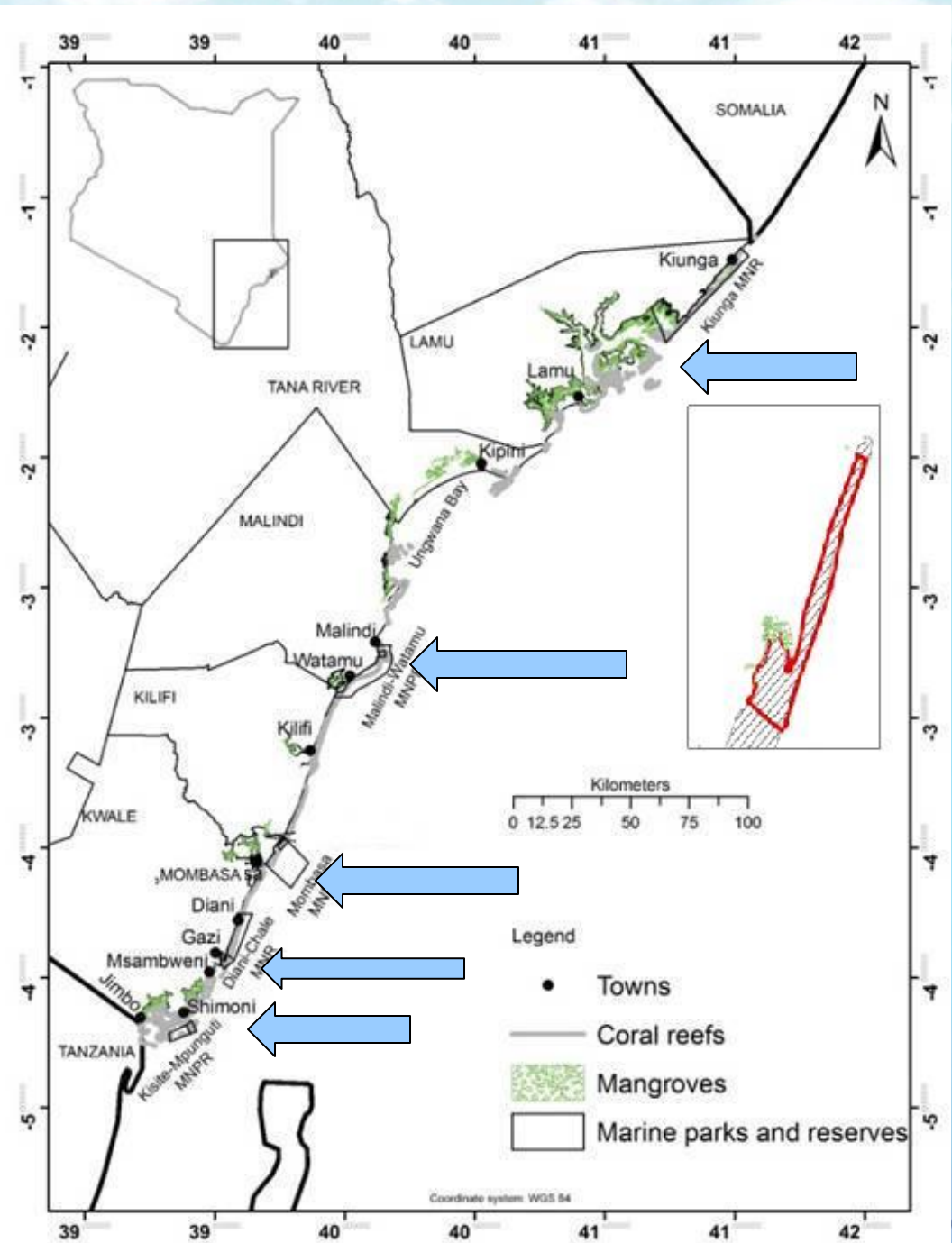
 Analysis focused on

- Commonly reported & used gears: basket traps, gill net, handline, speargun and beach seine
- Abundance of seven families


(Lutjanidae, Lethrinidae, Seranidae, Haemulidae  
Acanthuridae, Siganidae, & Scaridae)

# Study area


 Study sites grouped into six locations (N to S):  
Kiunga-Lamu,  
Malindi-Watamu,  
Mombasa, Diani -  
Chale, Gazi,  
Shimoni

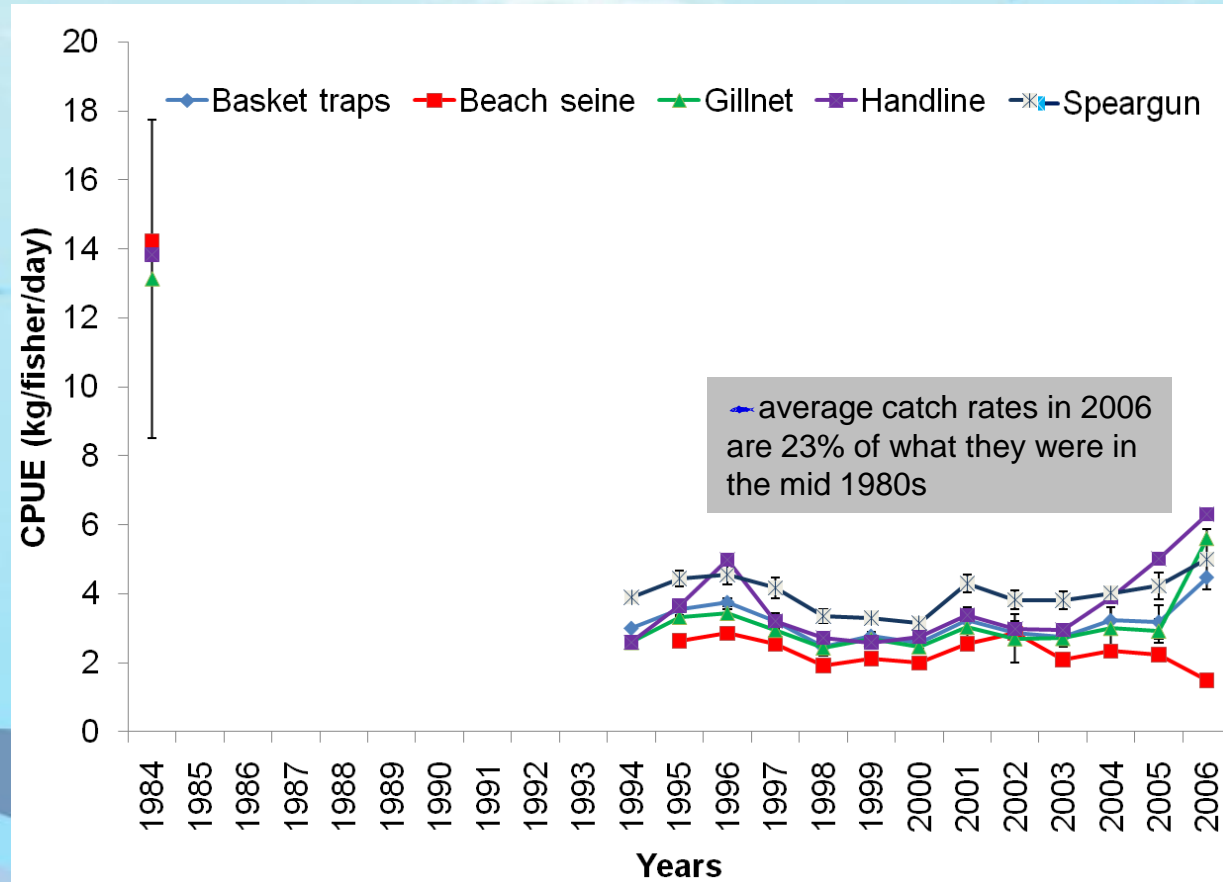



# Results

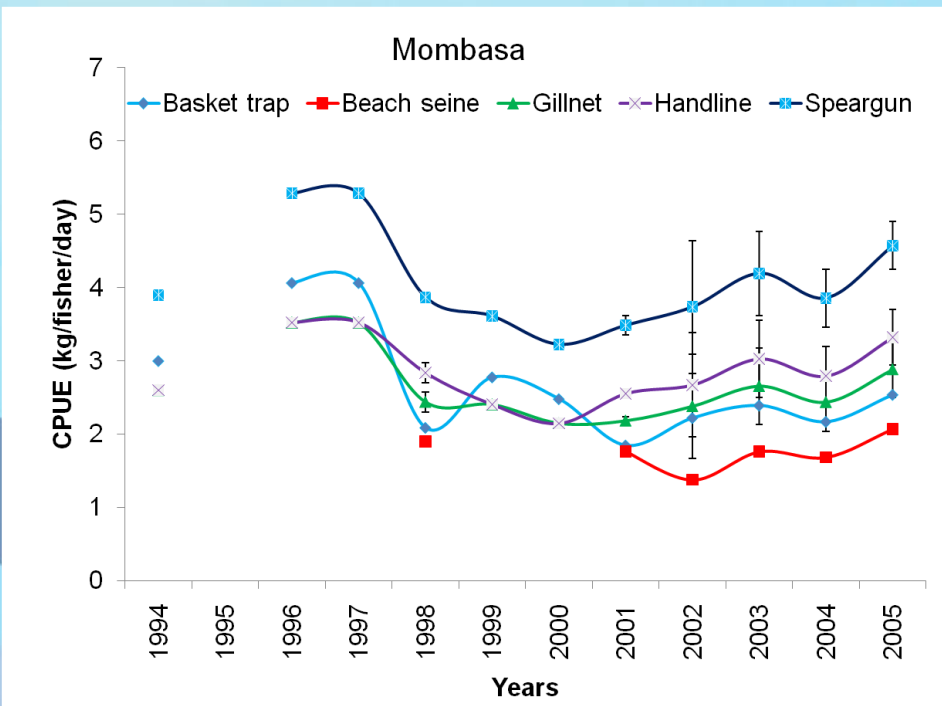
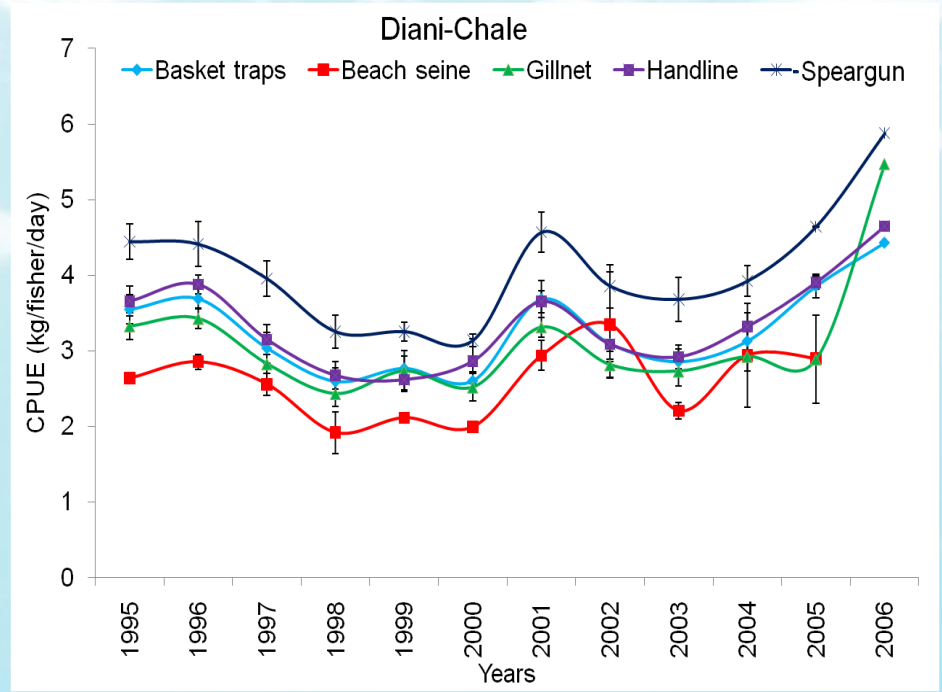
 Data sourced from 25 published & unpublished reports & data

## *a) CPUE trend*


 From 7 studies CPUE declined 4 fold from the mid 1980s ( $13.7 \pm 1.6$  kg/fisher/trip) to the 1990s ( $3.2 \pm 0.1$  kg/fisher/trip)




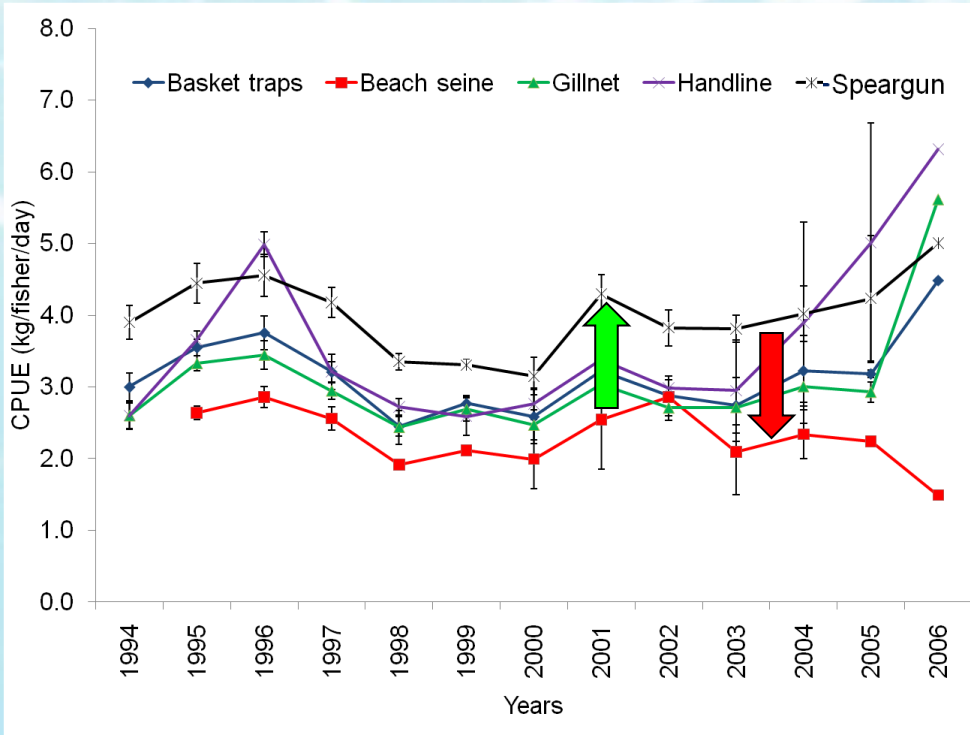
 Sufficient data for long term CPUE trend analysis were available for 2 locations; Mombasa and Diani-Chale.




# CPUE & Juvenile capture

 CPUE since 1994 have been stable

 Catch rates lowest in beach seine highest in spear guns (KW test;  $p < 0.01$ ).



Gear	Mean % juveniles
Traps	44.9
Gill net	49.4
Beach seine	68.4
Handline	55.6
Spear gun	38.2
All gears	50.1

 Juvenile capture highest in beach seine & lowest in spear guns



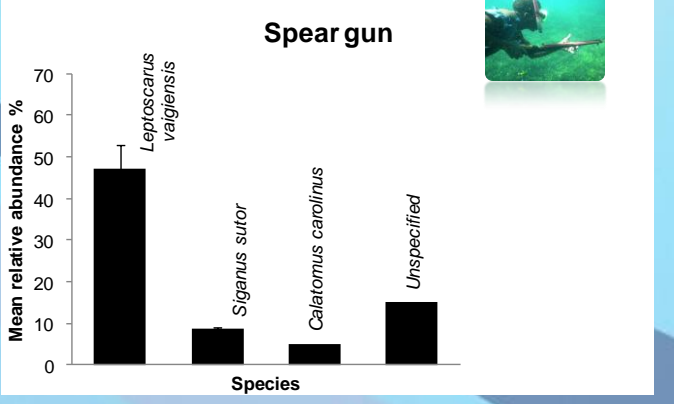
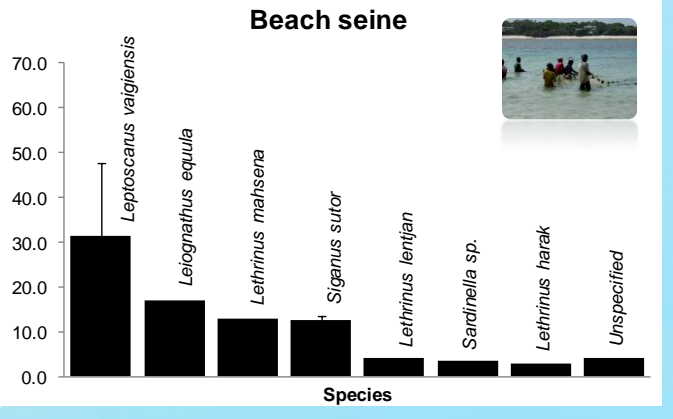
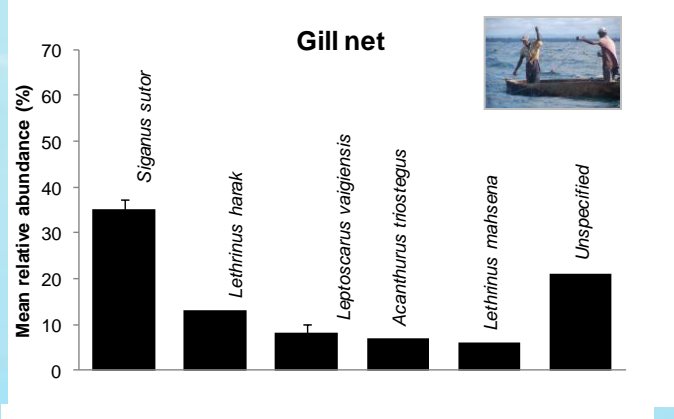
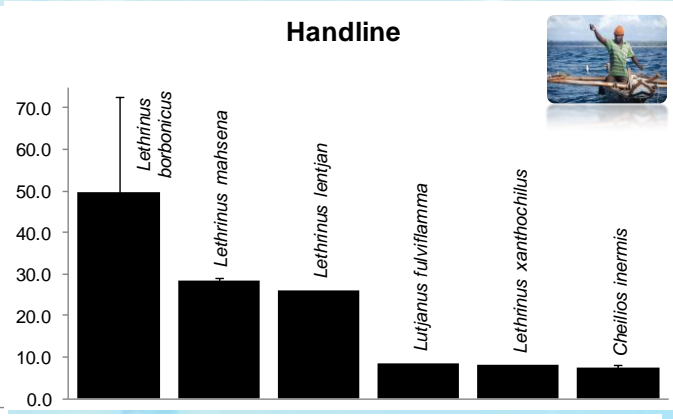
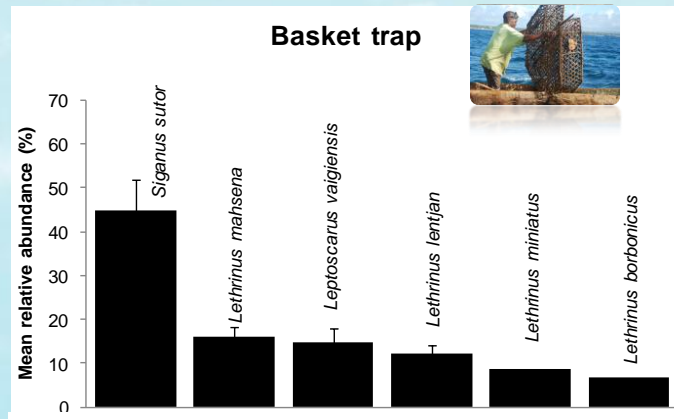


# b) Catch composition

Few species dominate the catches across all gears except handlines

Primary catches for all gears remarkably similar

*Siganus sutor* (max 44.8%) and *Leptoscarus vaigiensis* (47.3 %) dominated the catch

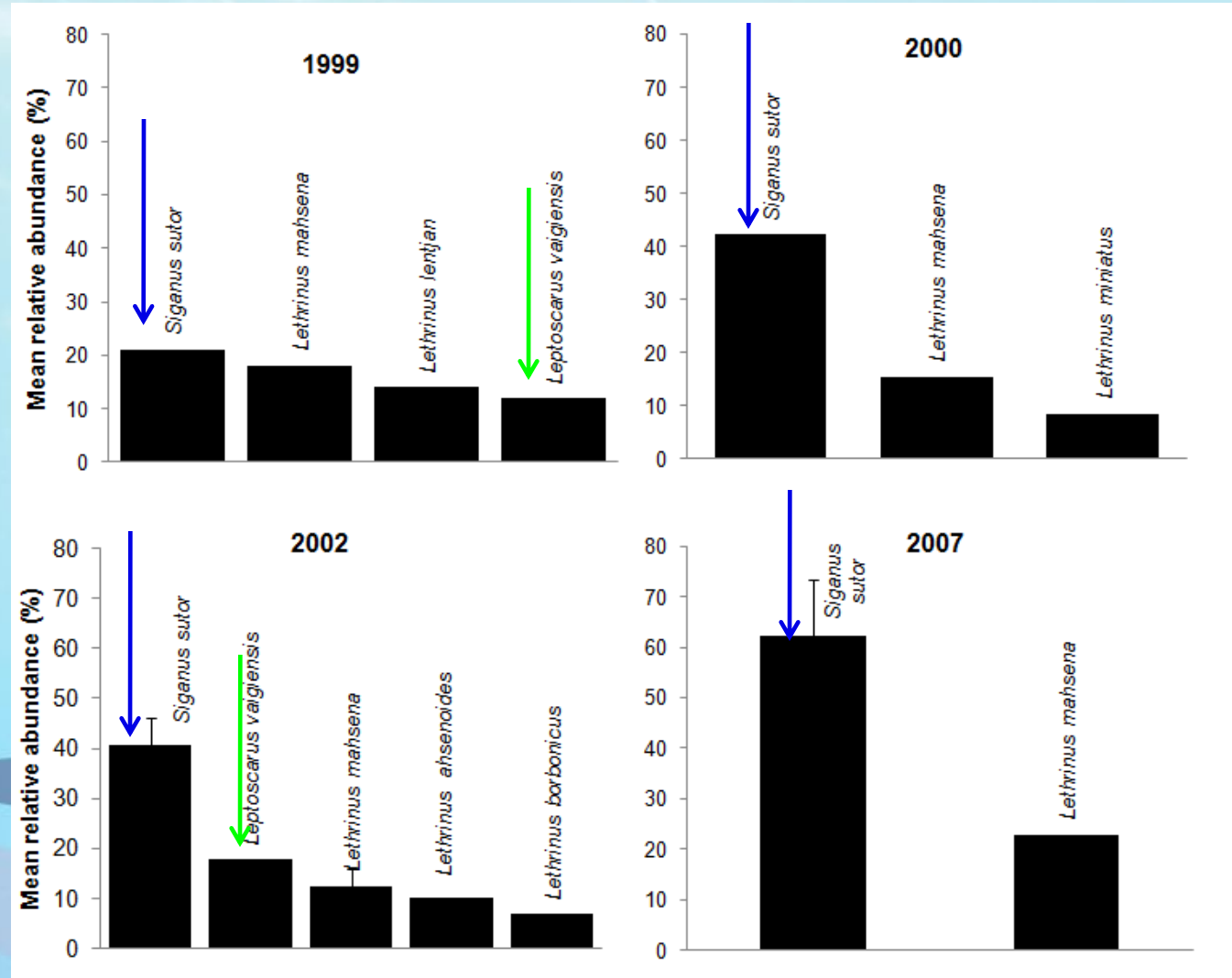


## c) Changes in catch composition over time

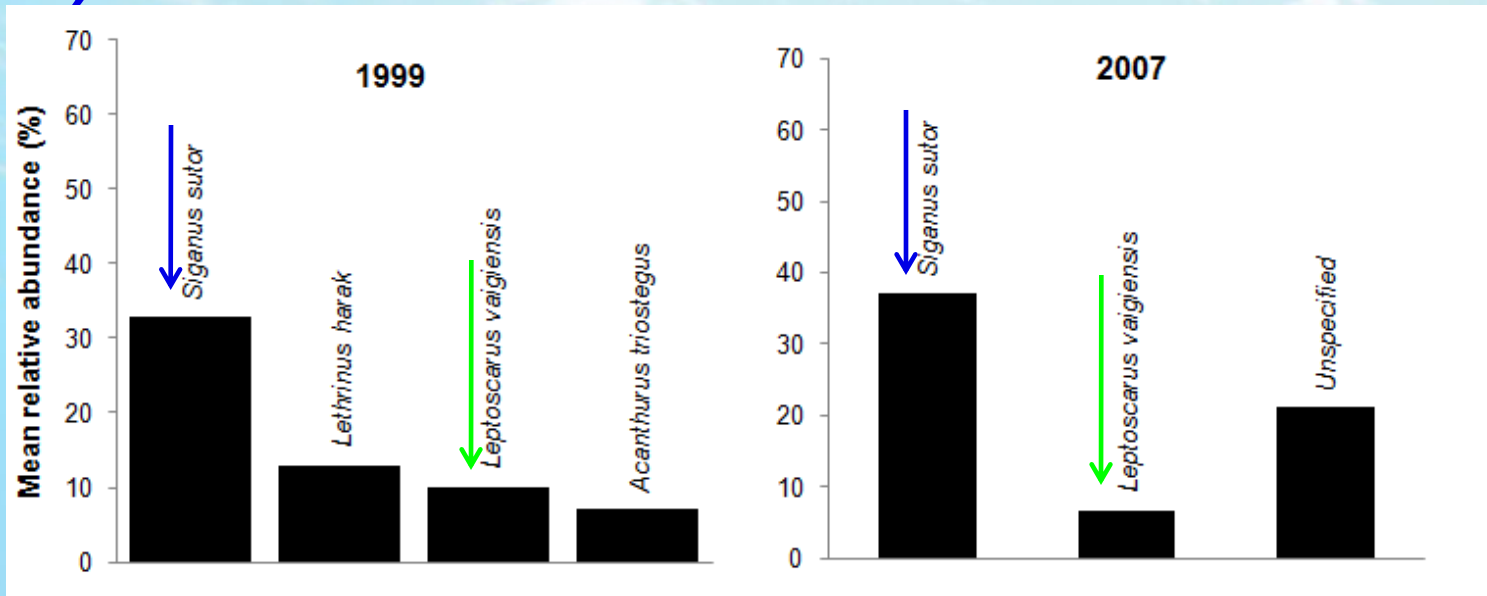
Species diversity has declined over time

Relative contribution of *S. sutor* and *L. vaigiensis* has increased substantially from 1999 to 2007

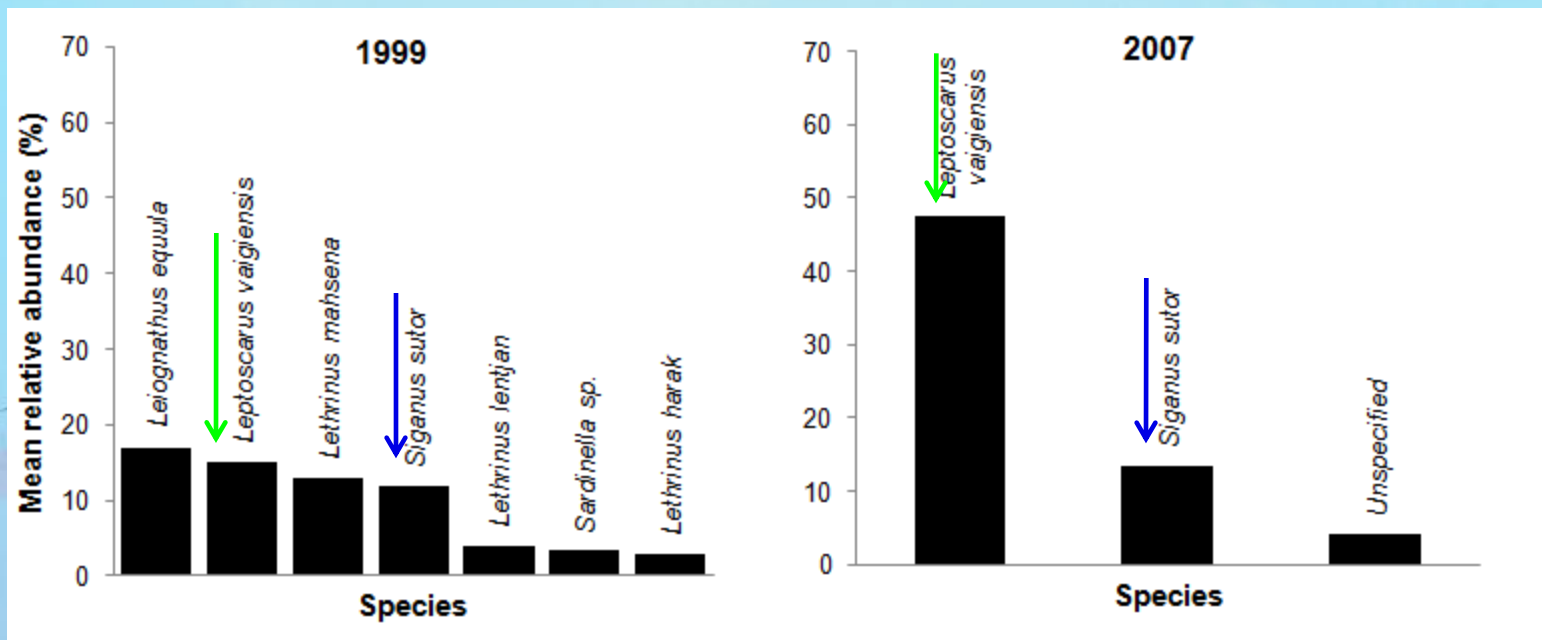
### i) Basket traps



## ii) Gill net

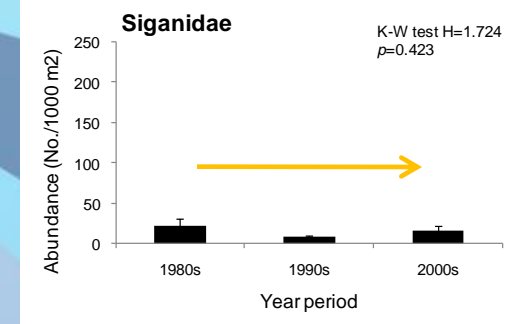
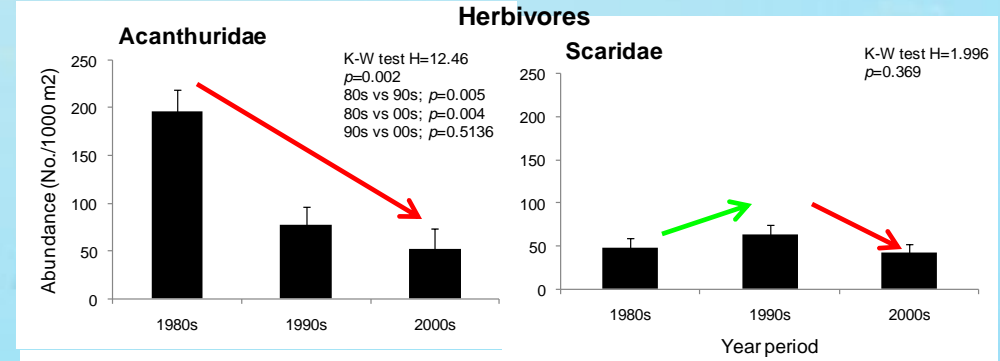
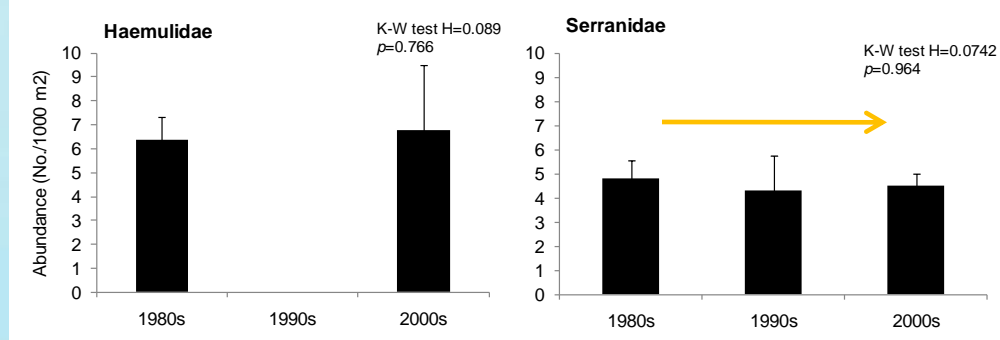
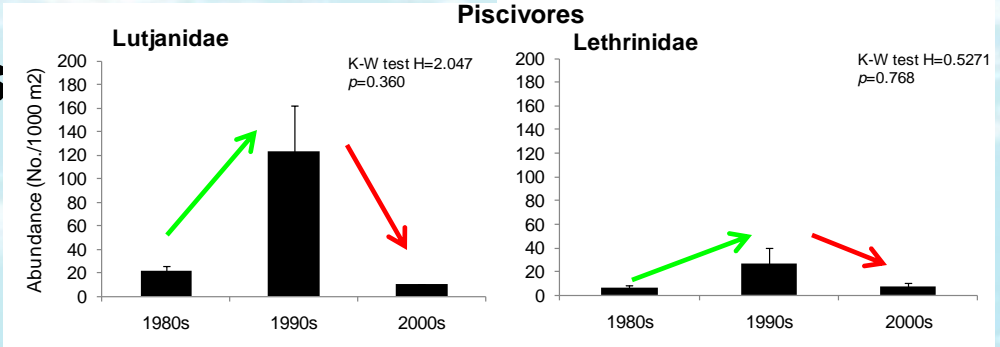


## iii) Beach seines




# d) Trends in fish densities

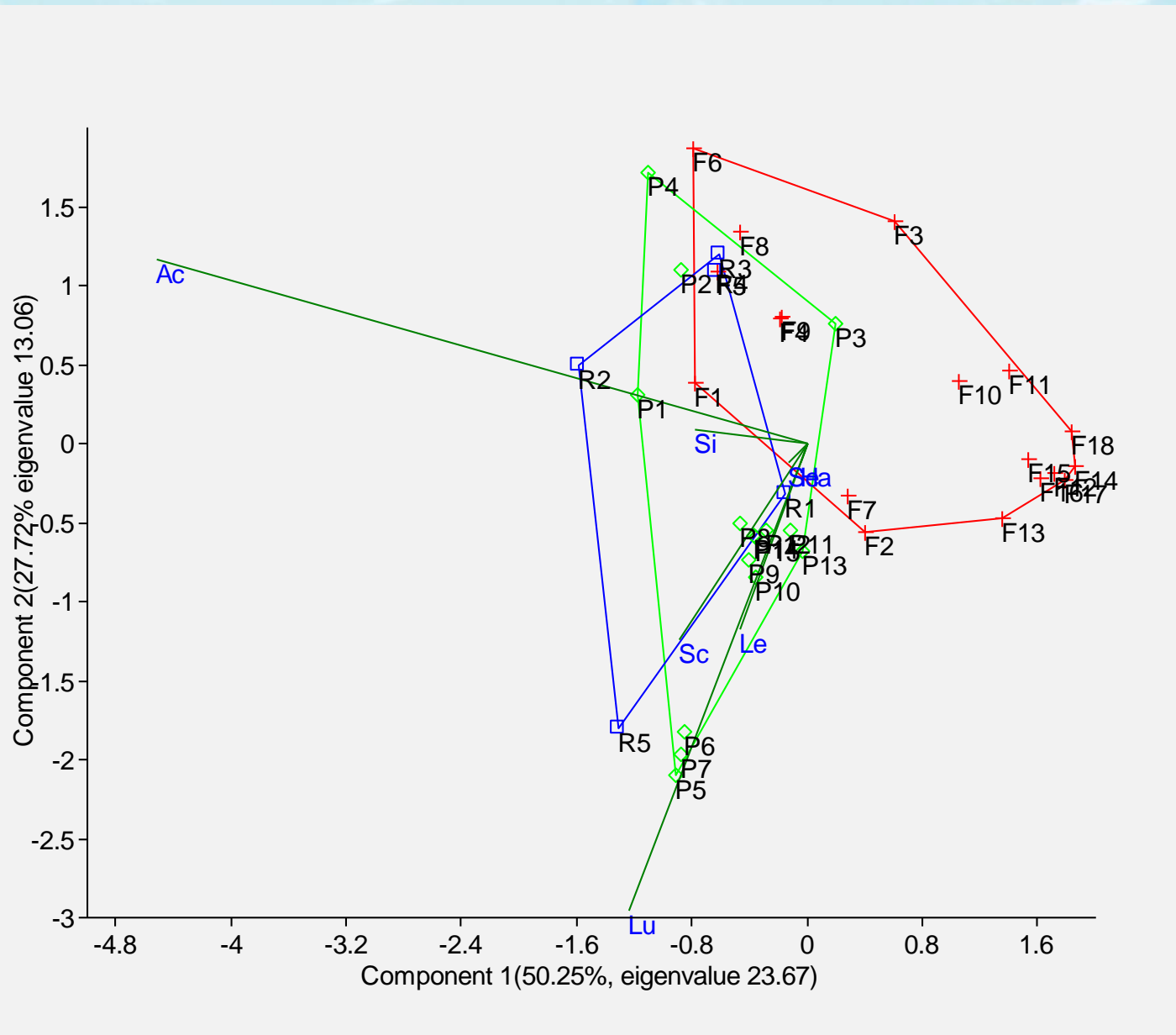
- Population density data provide an independent look at the status of fish stocks
- Fish densities variable over time. Differences between years NS for 6 of the 7 families.
- Some families show increase from the 1980s to peak in the 1990s and then decline in the 2000s
- Acanthurids showed a steady decline from the 1980s, (KW test  $p < 0.01$ )



# e) Management

 Effect of management on abundance of fish assessed using PCA

 Management zones: **Fished**, **Reserve & Parks**  
Based on KWS enforcement



# Summary

- 🐟 Protected areas and improved enforcement of fisheries regulation appear to have had positive effects on reef fish stocks
- 🐟 Steady CPUE from mid 1990s to 2006 suggests sustainable fishing across common artisanal gears
- 🐟 Declines in species diversity in catches are of concern with increasing effort on two key species: *S. sutor* (rabbit fish), *L. vaigiensis* (seagrass parrot fish). Species specific management plans might therefore be necessary.
- 🐟 Illegal status of spearguns not justified by results – lowest juvenile retention rates and highest CPUE. In contrast beach seine ban well supported by results.

**Thank you for  
your attention**



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