

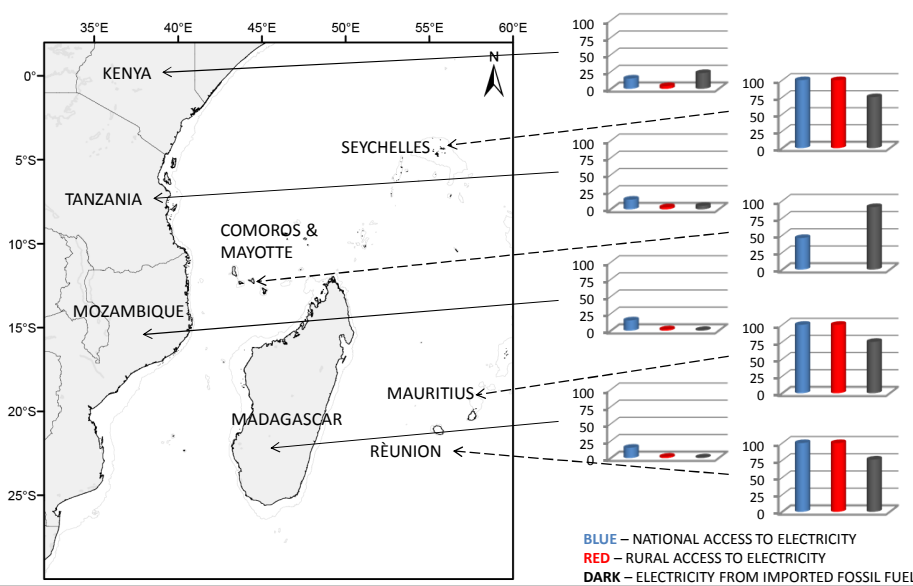
## OTEC – Suitable sites and challenges for the coastal environment



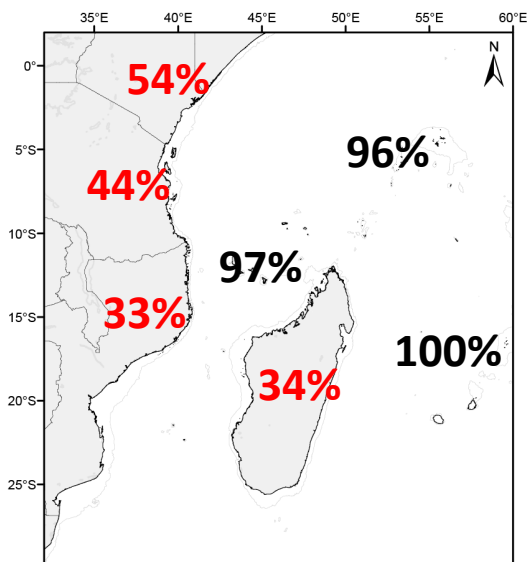
**LINUS HAMMAR**  
PHD CANDIDATE  
ENVIRONMENTAL SYSTEMS ANALYSIS



## NEEDS AND OPPORTUNITIES



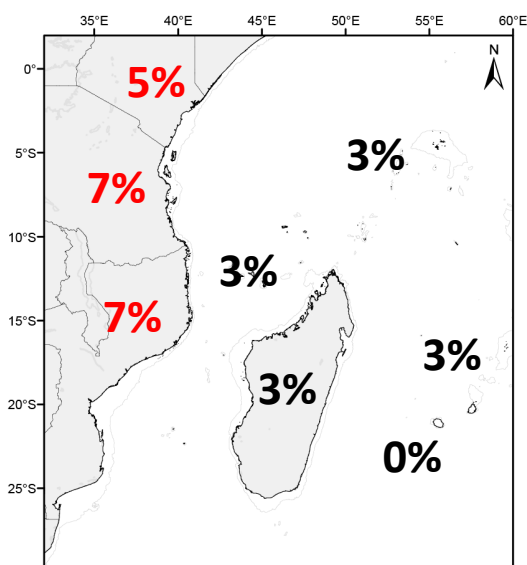
## NEEDS AND OPPORTUNITIES



ACCESS TO WATER  
IN EAST AFRICA

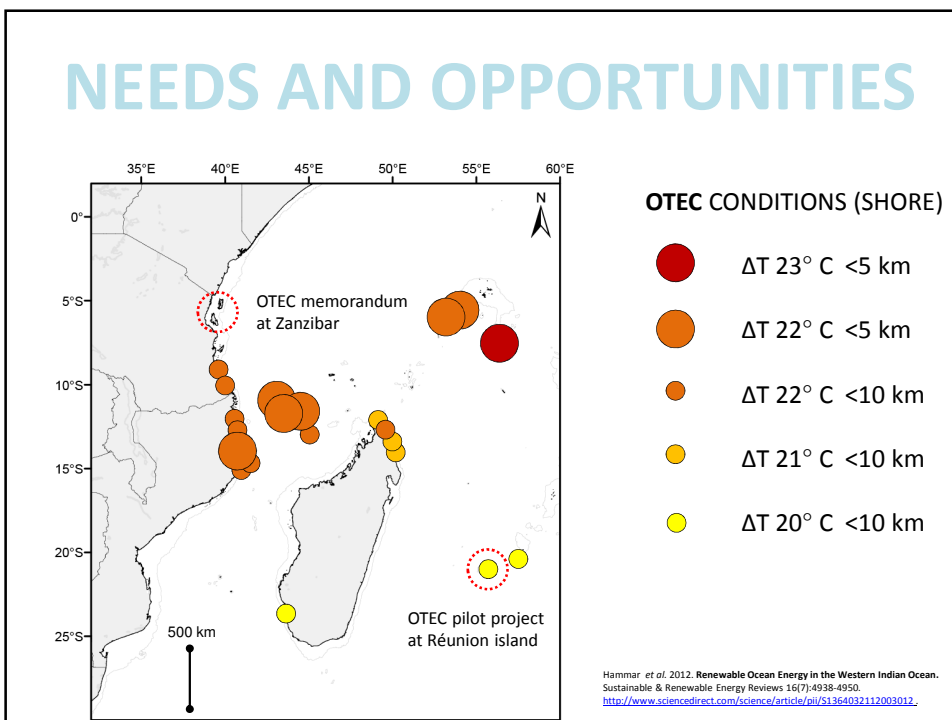
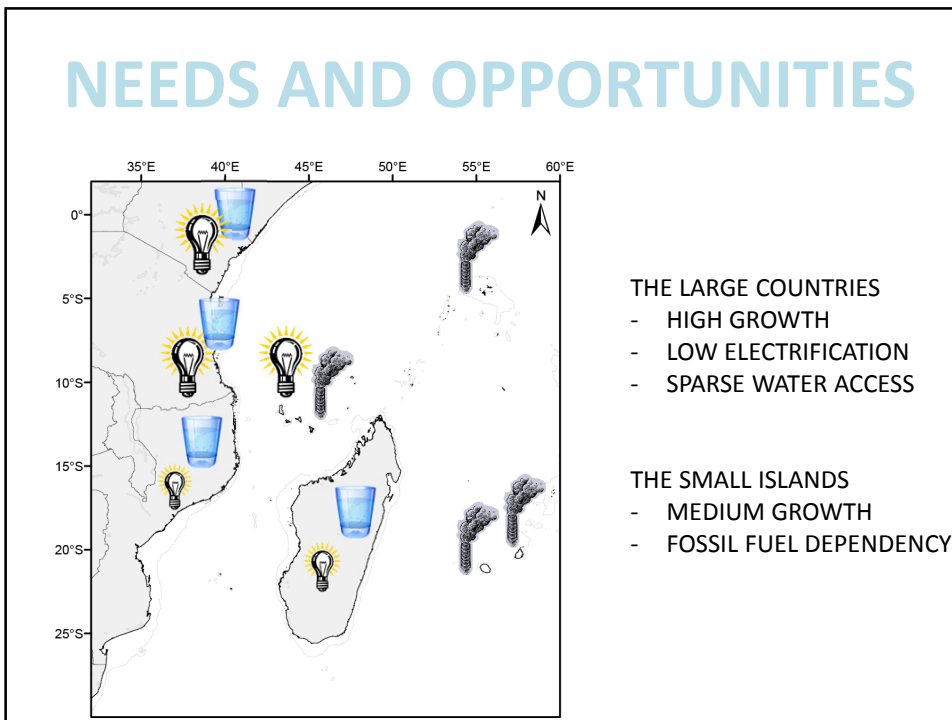
*RURAL AREAS*  
(urban areas are higher but follow the same pattern)

## NEEDS AND OPPORTUNITIES

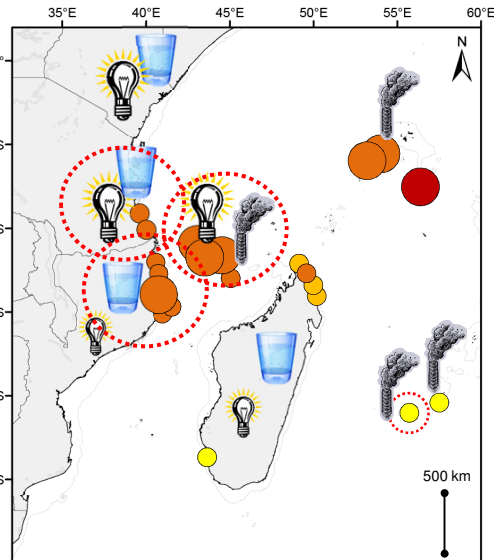


EAST AFRICA  
GDP GROWTH RATE  
(2012)

( EUROPEAN UNION: -0.3 % )



# NEEDS AND OPPORTUNITIES



## OPPORTUNITIES MEETING NEED

A BRIEF ASSESSMENT OF RESOURCE POTENTIAL FOR SHORE-BASED OTEC

COMOROS & MAYOTTE

NORTHERN MOZAMBIQUE

SOUTHERN TANZANIA

Hammar et al. 2012. Renewable Ocean Energy in the Western Indian Ocean. Sustainable & Renewable Energy Reviews 16(7):4938-4950. <http://www.sciencedirect.com/science/article/pii/S1364032112003012>.

# HINDSIGHT ON OCEAN USE



1750                      1900                      1950                      2000

A HISTORY OF TECHNOLOGICAL DEVELOPMENT AND UNRESTRICTED USE OF COMMON RESOURCES

LIMITED IMPACT	INTENSIFIED RESOURCE EXPLOITATION	FISHERIES OVEREXPLOITED	35% OF WORLD FISH STOCKS DEPLETED OR OVEREXPLOITED
	LOCAL OVEREXPLOITATIONS	WHALE STOCKS FULLY COLLAPSE	40% OF COASTAL SEAS HEAVILY AFFECTED
			90-99% DEPLETION OF LARGE OFFSHORE FISH
			100% OF OCEAN AFFECTED BY HUMANS

Sources: Smith (2000), Jackson (2008). Photos (fr. left): Peder Jacobsson, Creative Commons, Grinebiter, Nick Boileau, Ramon Benedet, Patrick Powers, Avian Pursuit

# HINDSIGHT ON OCEAN USE



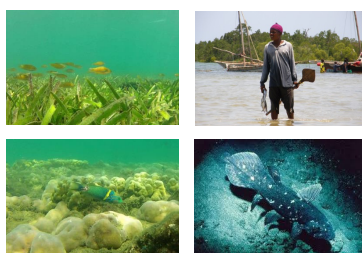
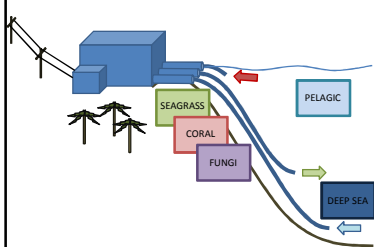
SUSTAINABLE USE OF OCEAN RESOURCES REQUIRES PROACTIVE ECOSYSTEM-BASED MANAGEMENT

*'It's hard to predict effects when technology is young, but once it has spread, it's difficult to control it'*

The Collingridge dilemma (1981)

Sources: Smith (2000), Jackson (2008). Photos (fr. left): Peder Jacobsson, Creative Commons, Grinebiter, Nick Boileau, Ramon Benedet, Patrick Powers, Avian Pursuit

# ECOLOGICAL RISKS OF OTEC



## POSSIBLE ECOLOGICAL EFFECTS

- Eutrophication (enormous effects in nutrient deficient ecosystems)
- Habitat degradation/loss (consider cumulative effects)
- Species-specific mortalities (beware key-stone species)
- Degraded ecosystem services

## MAIN ECOLOGICAL STRESSORS (partly technology-specific)

- Disturbance of thermal and salinity gradients
- Change of dissolved gases, nutrients and turbidity
- Impingement and entrainment of fauna
- Biocide release
- Accidental spill of working fluid (ammonia)

## RISK MANAGEMENT

- Serious consideration of design
- Don't start at the most pristine areas
- Secure fully robust constructions

# BUT, THERE SURE IS A NEED



*...and perhaps OTEC  
can provide a solution*

