

# Adapting to Climate Change – experiences from WCS in Madagascar





# WCS Marine Programs



 Terrestrial programs

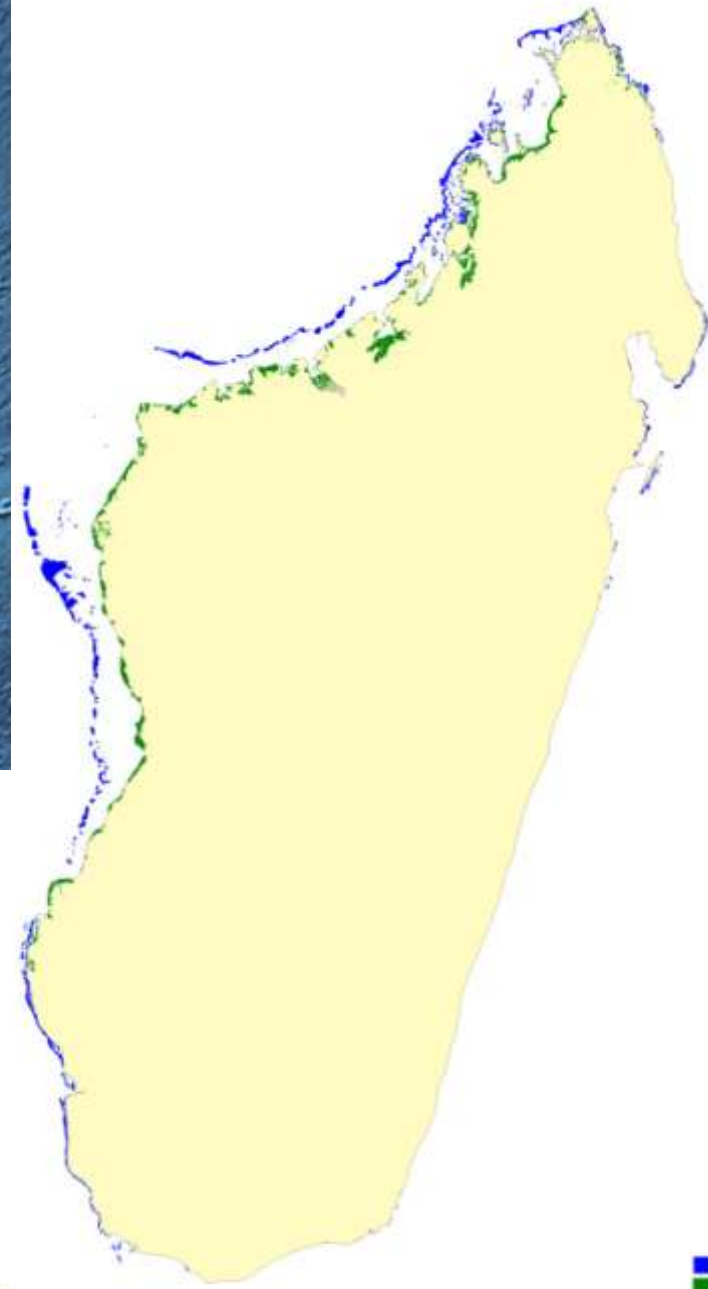
 Marine Programs







5000 km coastline  
Highest coral reef area  
Highest coral diversity



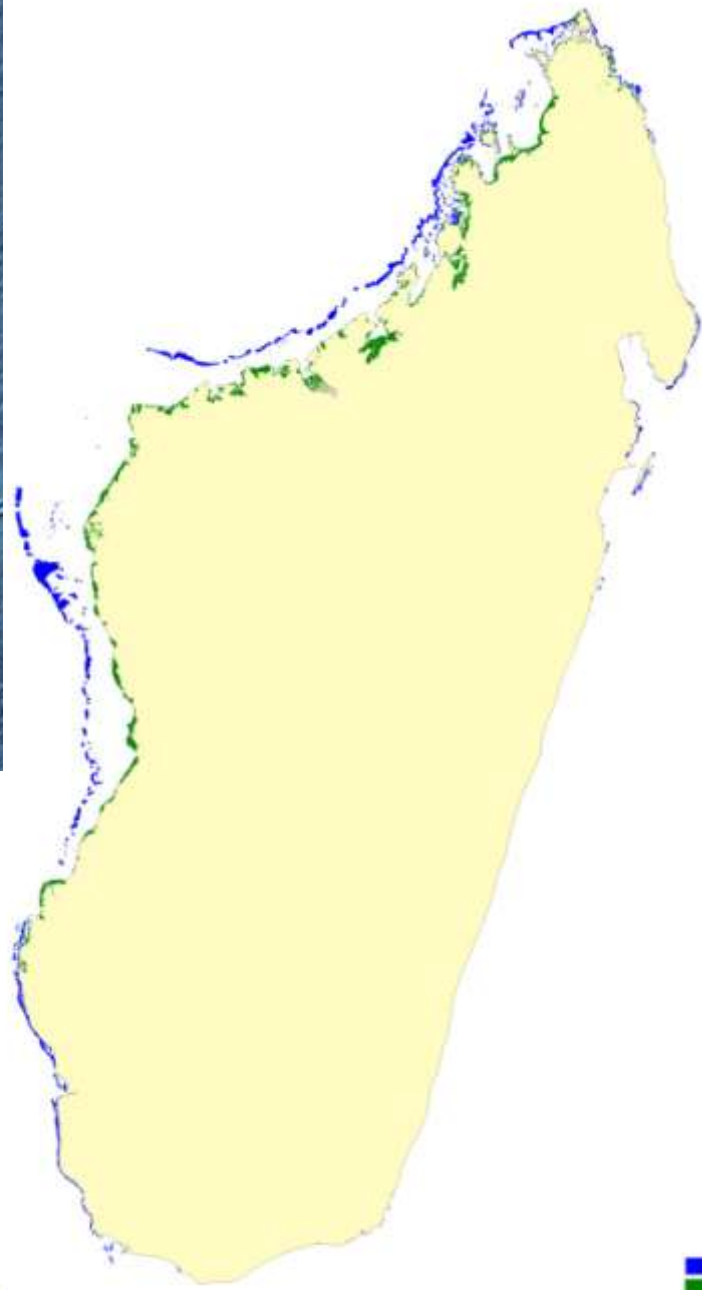


11/11/2011





Highest mangrove area











High dependence on marine resources:

- 10 million inhab. near coast
- 100,000 small scale fishers
- 85% live on less \$2/day



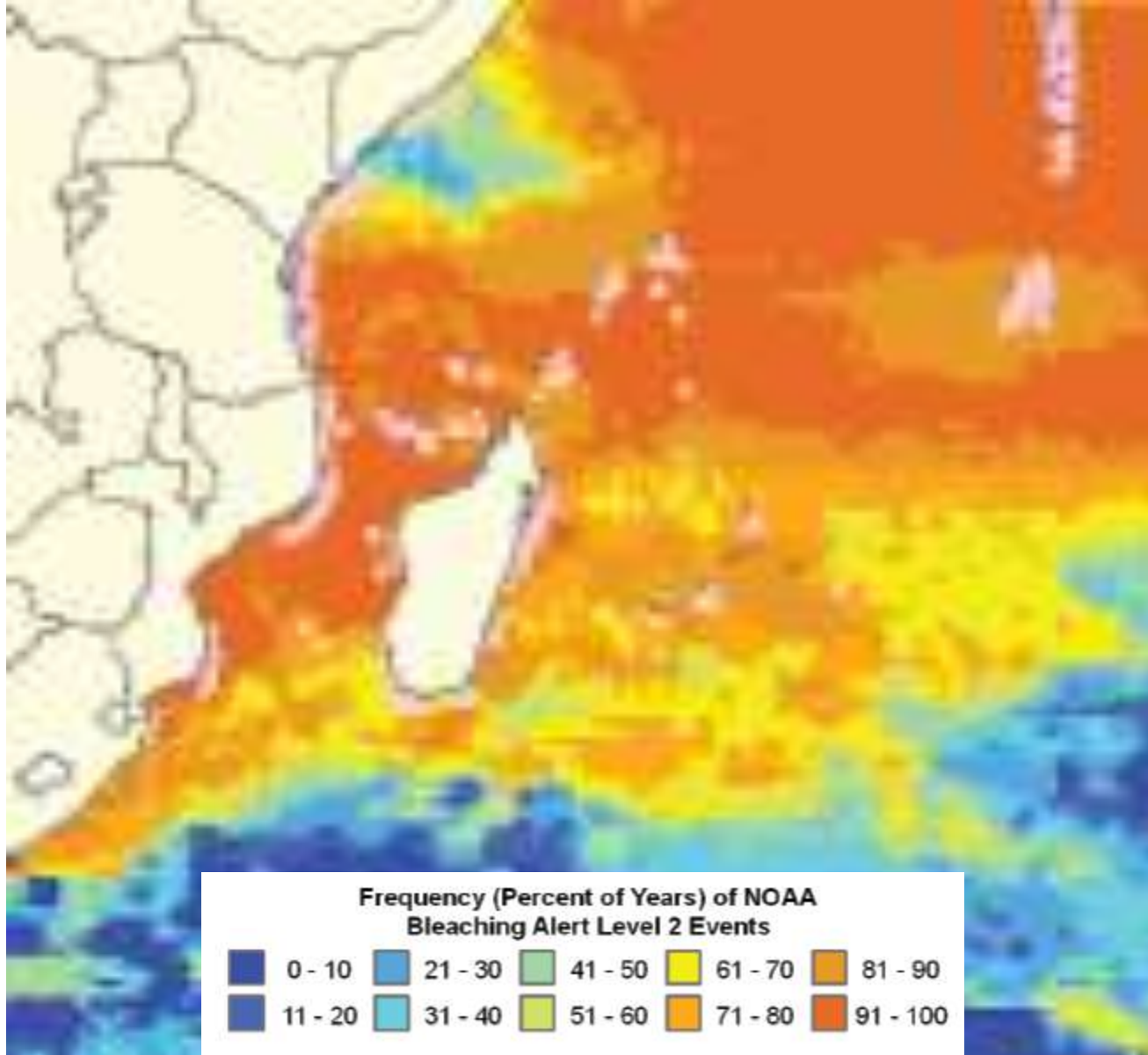


### Coral Reefs Classified by Integrated Local Threat Level

● Low ● Medium ● High ● Very High ● Outside of Region



87% reef  
threatened  
(source: Reefs at Risk  
Revisited)



Frequency of future bleaching event in the 2050s  
(source: Reefs at Risk Revisited)



# 1 – ASSESS VULNERABILITY

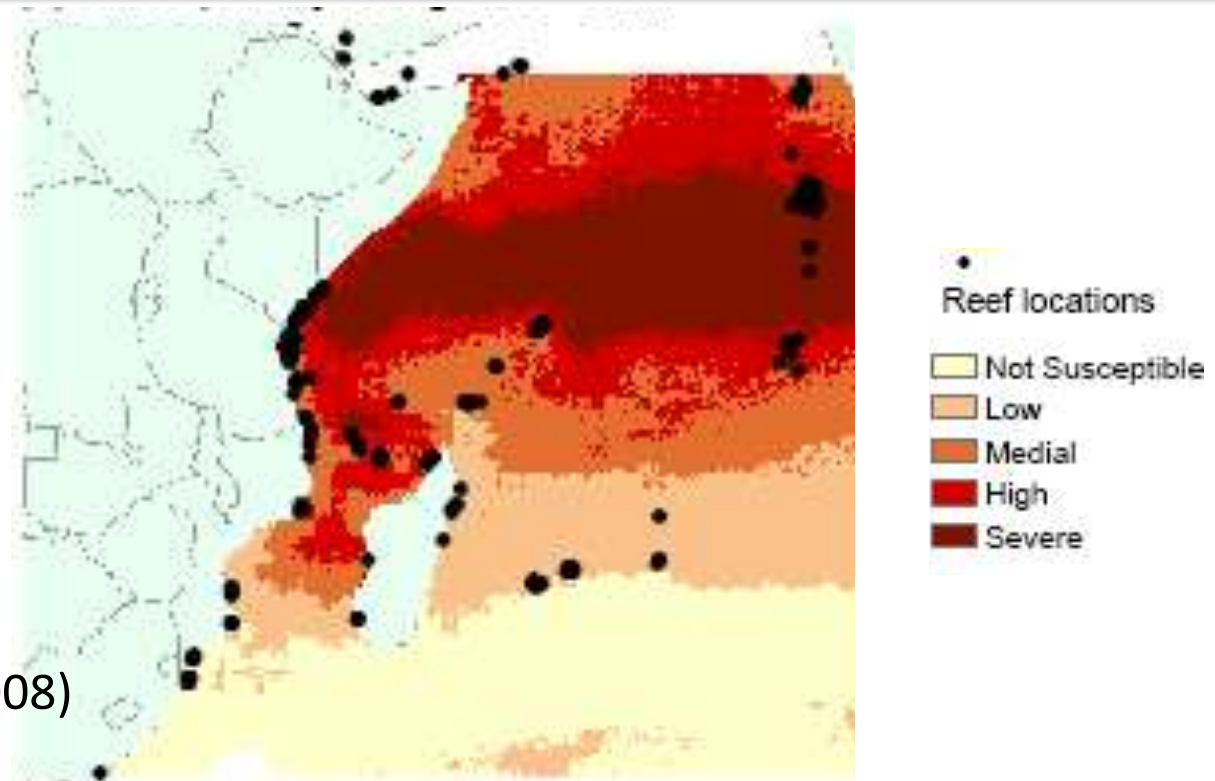
- How coral reef and reef dependant societies are being affected by, and what capacity they have to adapt to, climate change impacts ?



# Vulnerability to Climate Change

$f$  (**Exposure**, Sensitivity, Adaptive capacity)

The amount of climate change occurring at a particular place



(source: Maina et al. 2008)



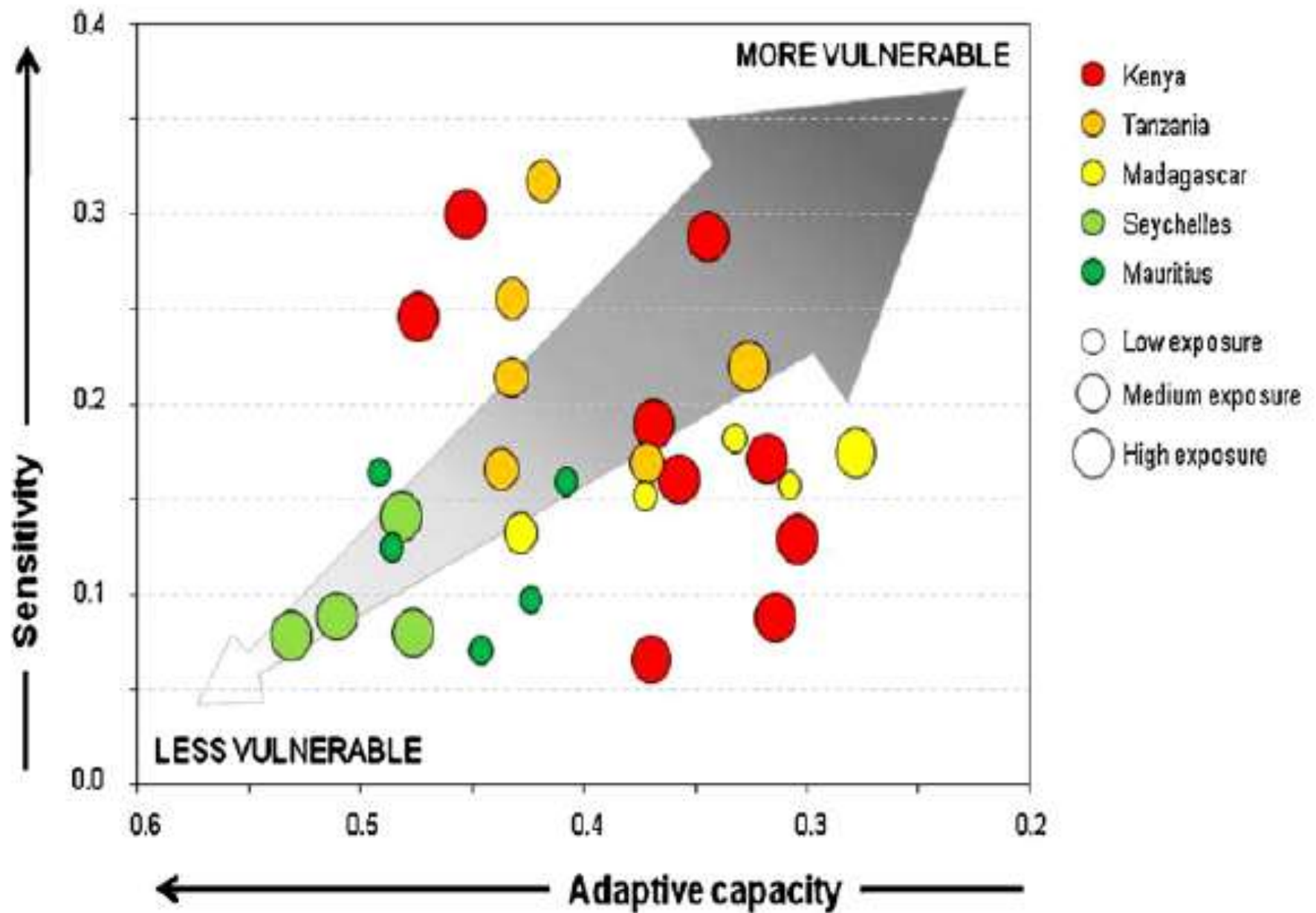
# Vulnerability to Climate Change

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f (Exposure, **Sensitivity**, Adaptive capacity)

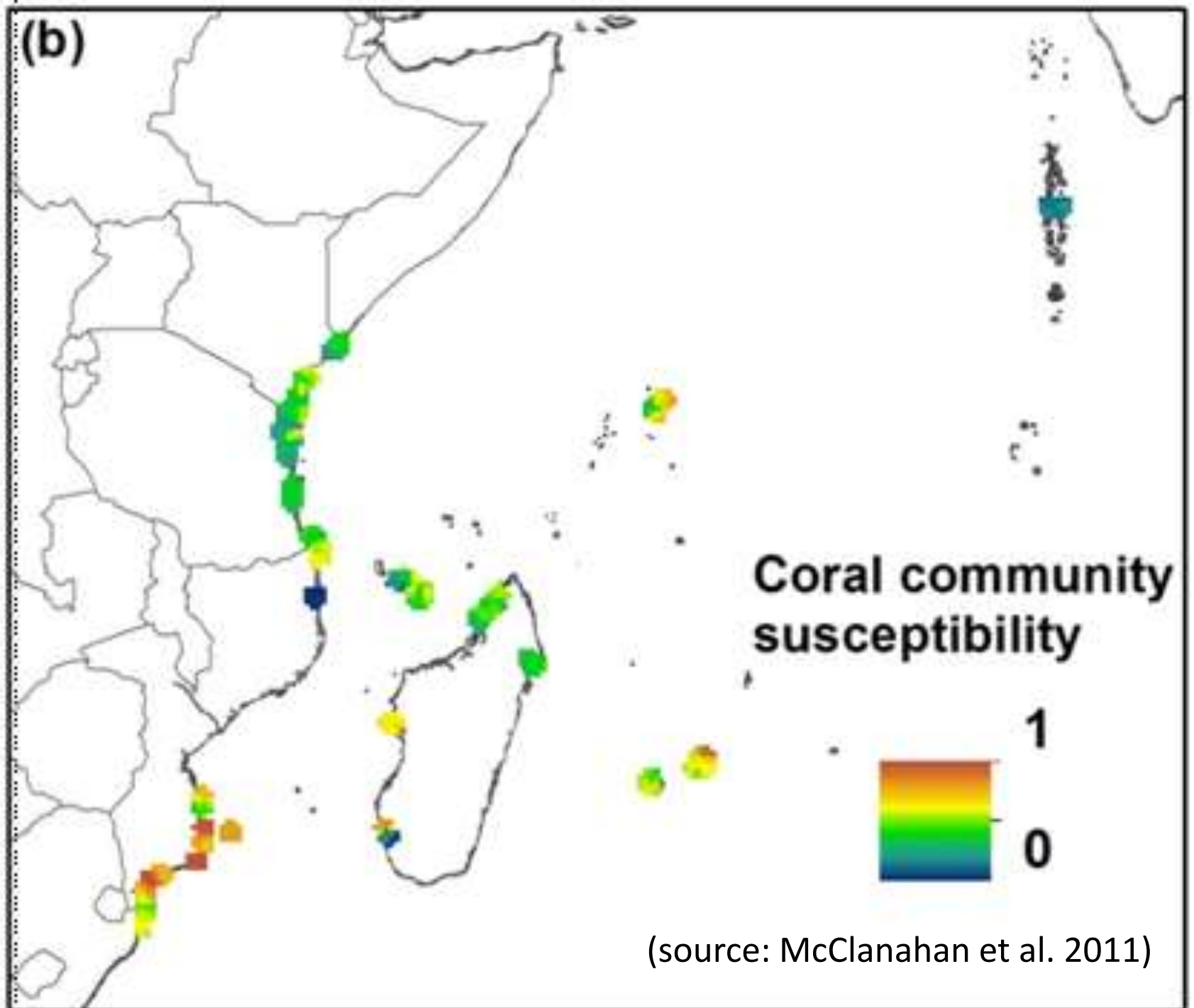
Degree of impact that a stressor has on something.





(source: Cinner et al. 2011)

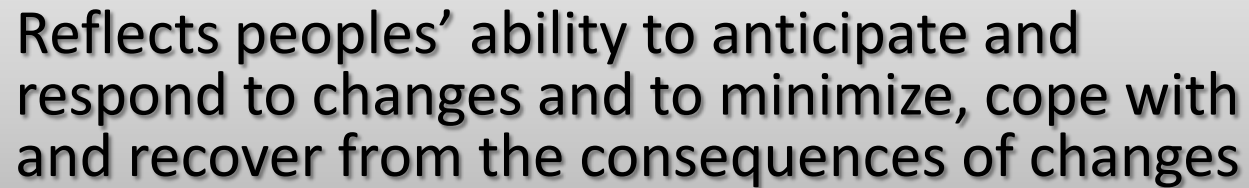




# Vulnerability to Climate Change

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f (Exposure, Sensitivity, **Adaptive capacity**)



Reflects peoples' ability to anticipate and respond to changes and to minimize, cope with and recover from the consequences of changes

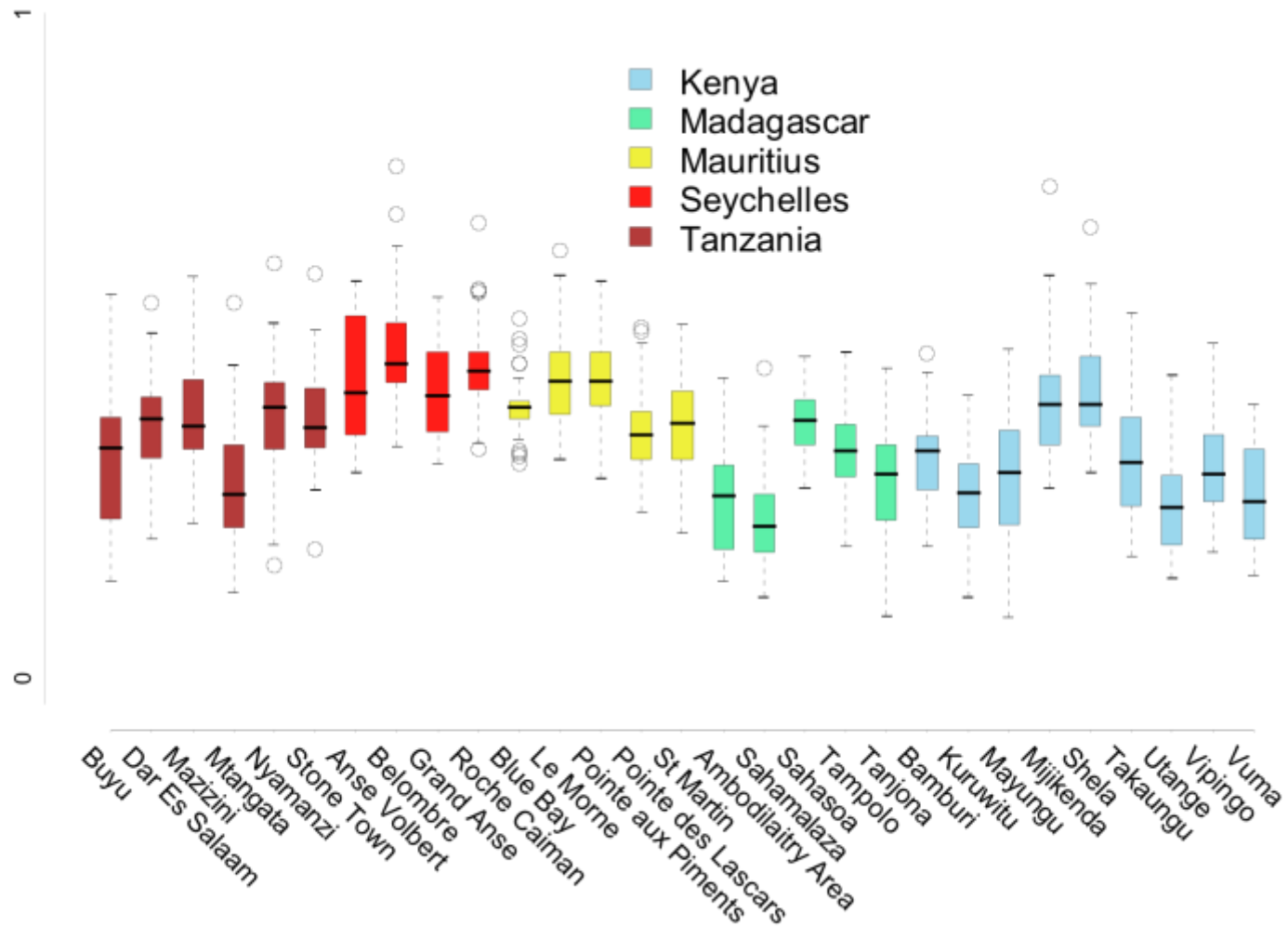


# Calculating Adaptive Capacity

- Eight indicators... (source: McClanahan, Cinner et al. 2008)

Indicator name	How measured
Local knowledge	Recognition of factors affecting fish and suggestions for intervention
Response to fisheries decline	Hypothetical response to a 50% decline
Occupational mobility	Whether they were forced out of prior employment and whether they prefer new occupation.
Wealth	Material style of life (PCA of housing materials and appliances in the household)
Occupational multiplicity	Total number of occupations per household
Social capital	Membership of community organizations'
Technology	Number of gears used by fishing households
Infrastructure	PCA of facilities available in the community: health posts and hospitals, schools etc.

# Household adaptive capacity





# 2 – DESIGN ADAPTION STRATEGIES

**(Exposure, Sensitivity, Adaptive capacity)**

Marine spatial  
planning

```
graph BT; A[Marine spatial planning] --> C[Exposure, Sensitivity, Adaptive capacity]; B[Decrease fishing communities dependence on reef resources  
Strengthen condition of reef and resources (decrease local threats)] --> C; D[Build adaptive capacity] --> C;
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The diagram illustrates three design adaptation strategies that contribute to the overall goals of Exposure, Sensitivity, and Adaptive capacity. Each strategy is represented by a colored box with an arrow pointing upwards towards the central text. The first strategy, 'Marine spatial planning', is in a yellow box. The second strategy, 'Decrease fishing communities dependence on reef resources' and 'Strengthen condition of reef and resources (decrease local threats)', is in a blue box. The third strategy, 'Build adaptive capacity', is in a green box.

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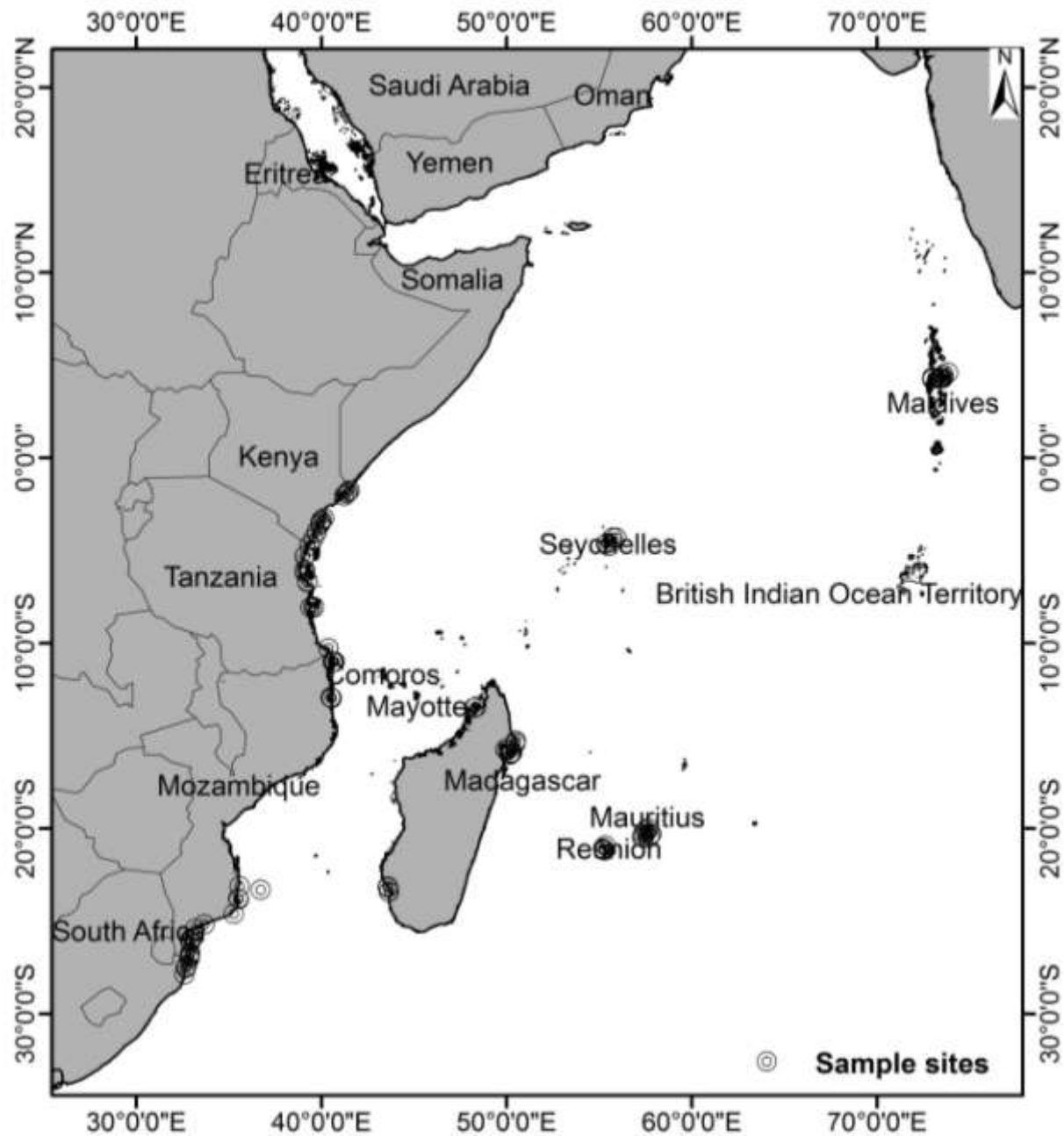
Build adaptive  
capacity

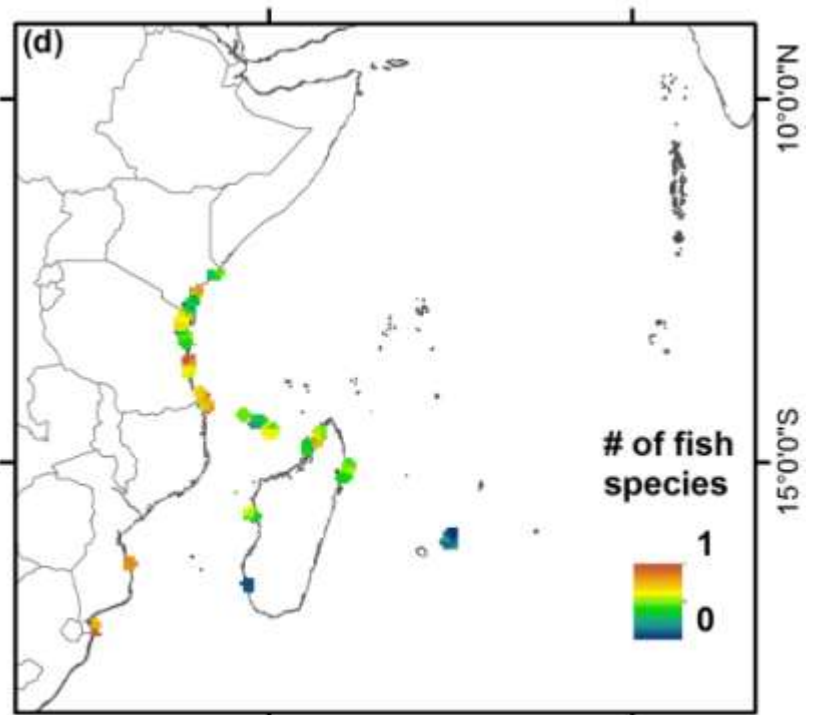
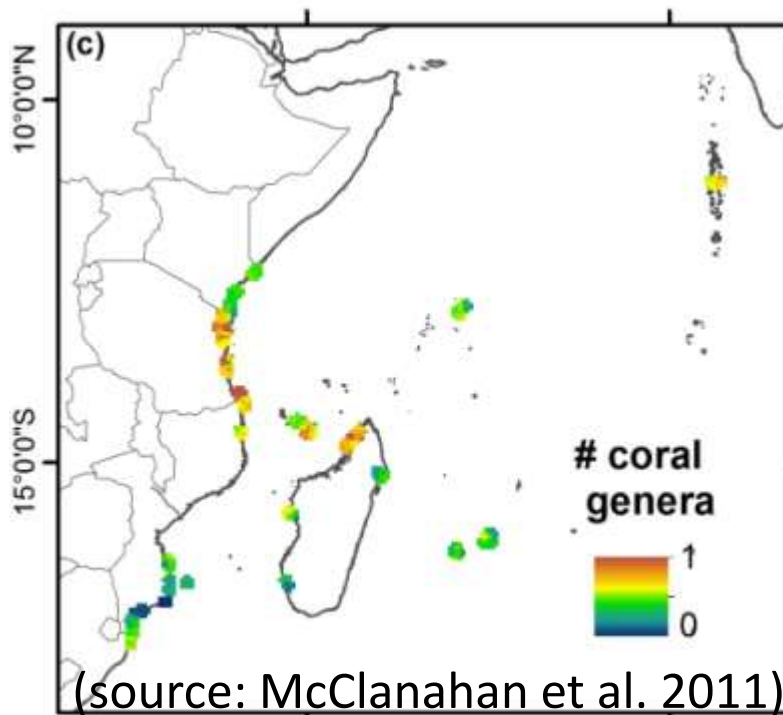
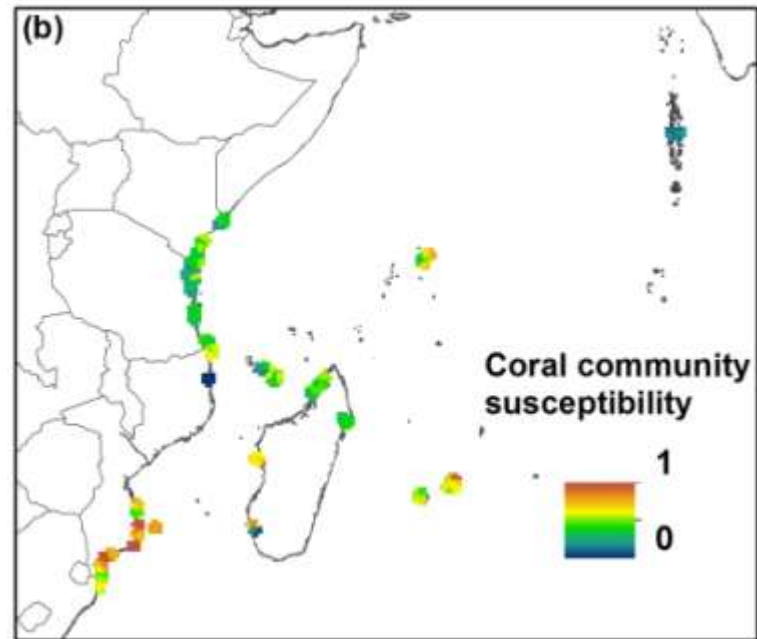
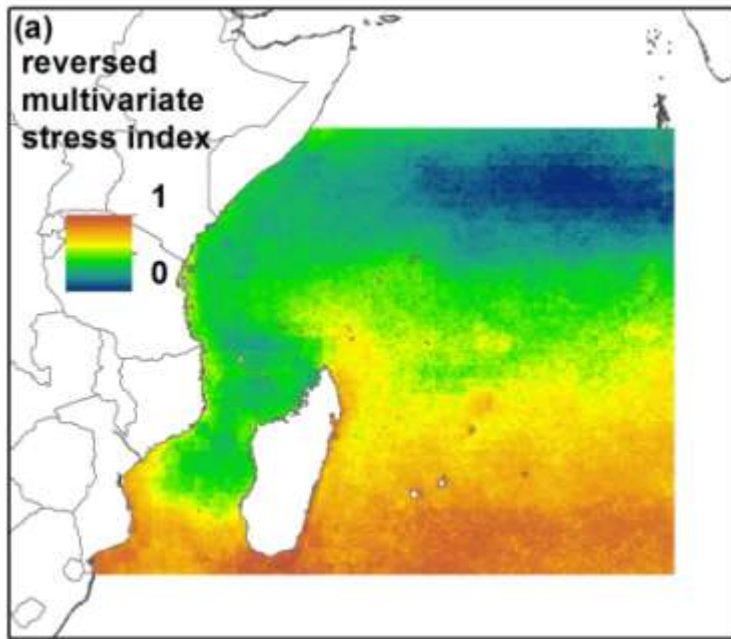
# Marine spatial planning





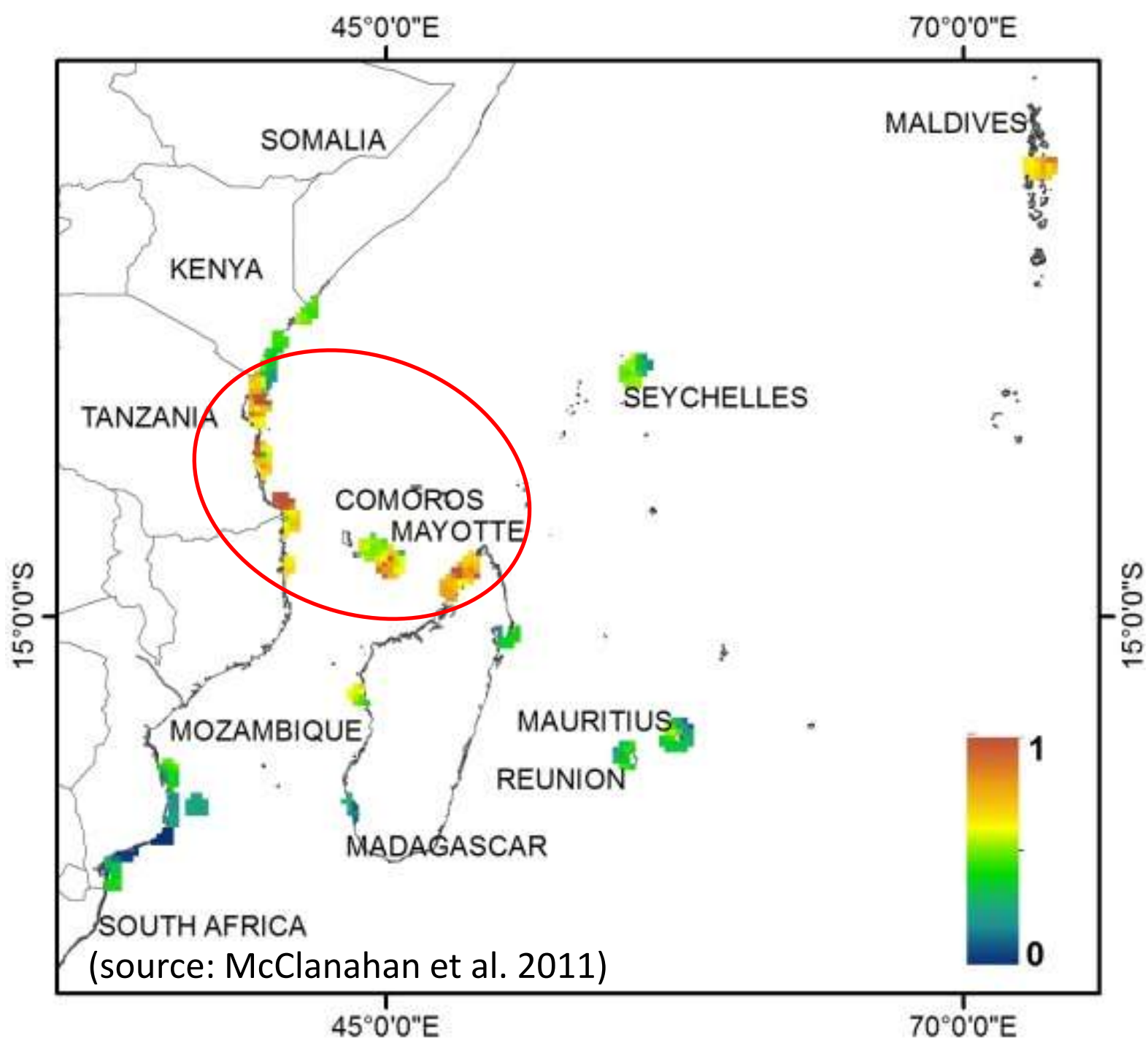
# Fish and coral data study sites





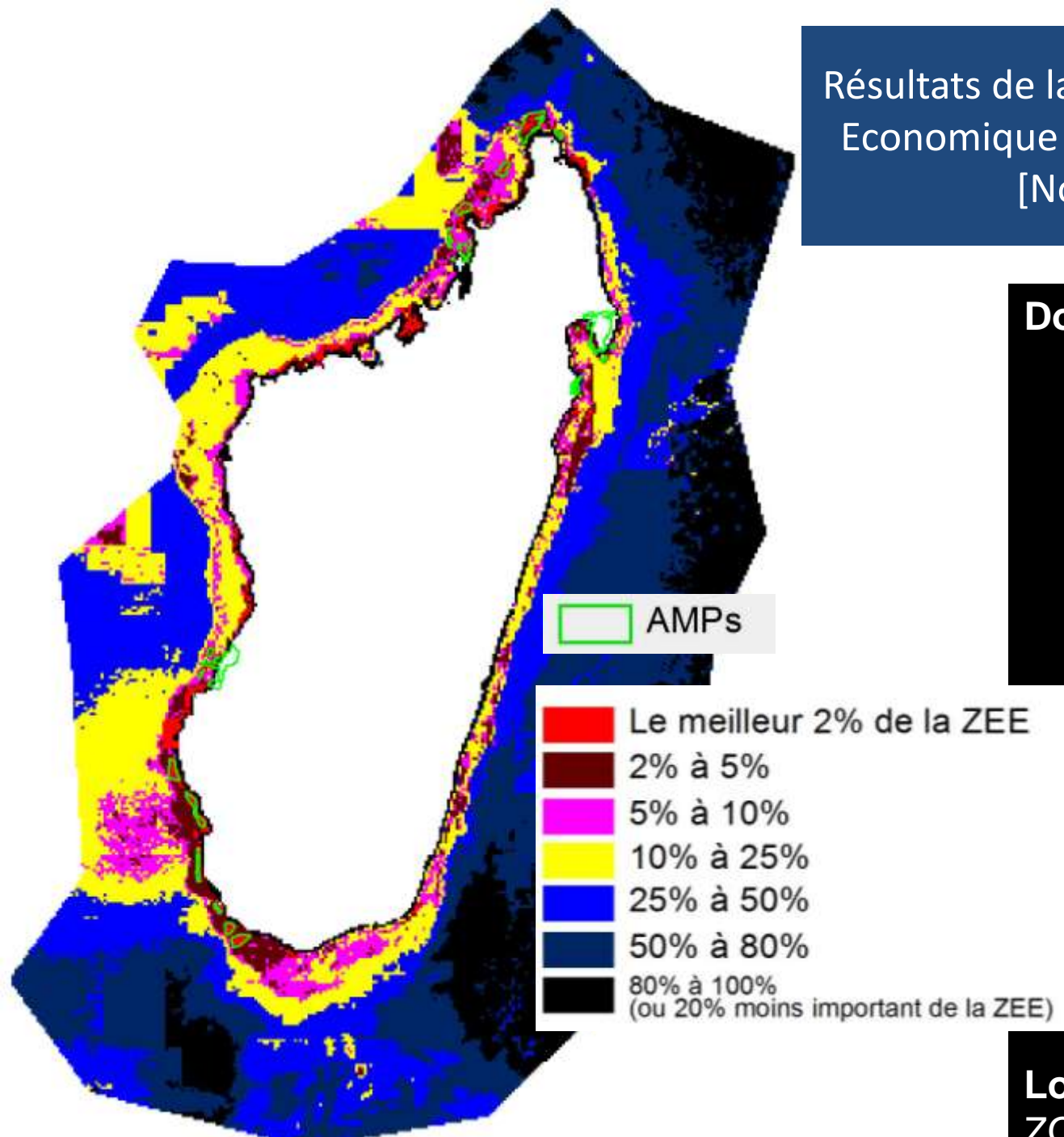
(source: McClanahan et al. 2011)





(source: McClanahan et al. 2011)

## Résultats de la priorisation dans la Zone Economique Exclusive de Madagascar [Novembre 2010]



### Données utilisées:

- ✓ 110 modèles de distribution de Poissons, Mollusques, Crustaceae, Echinodermes

- ✓ Cartes des habitats (Mangroves, récifs coralliens)

- ✓ Carte de Vulnérabilité des récifs (Maina & al, 2008)

- ✓ Limite des AMPs existantes

**Logiciel de planification:**  
ZONATION

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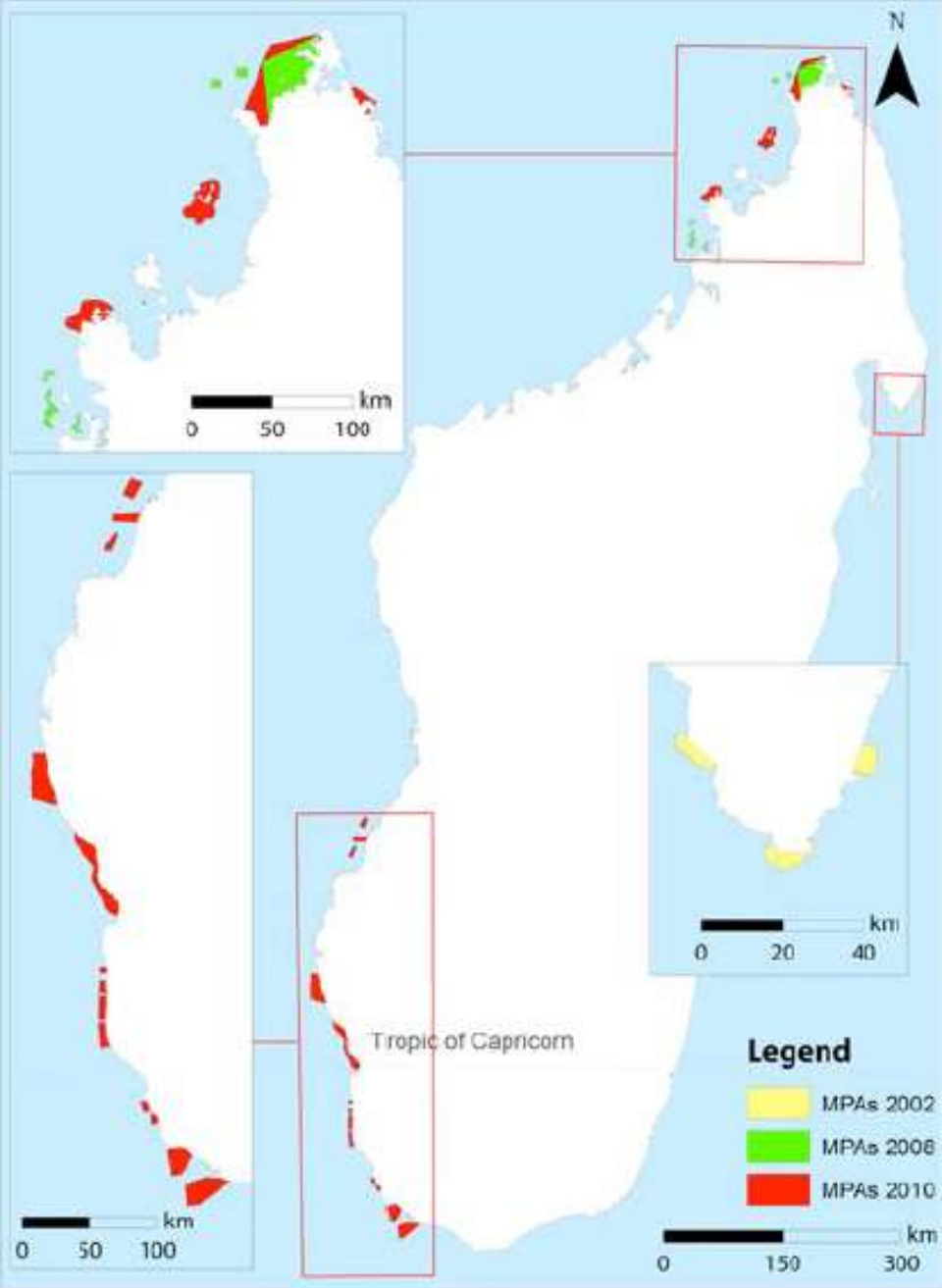
Build adaptive  
capacity



Strengthen condition of reef and  
resources



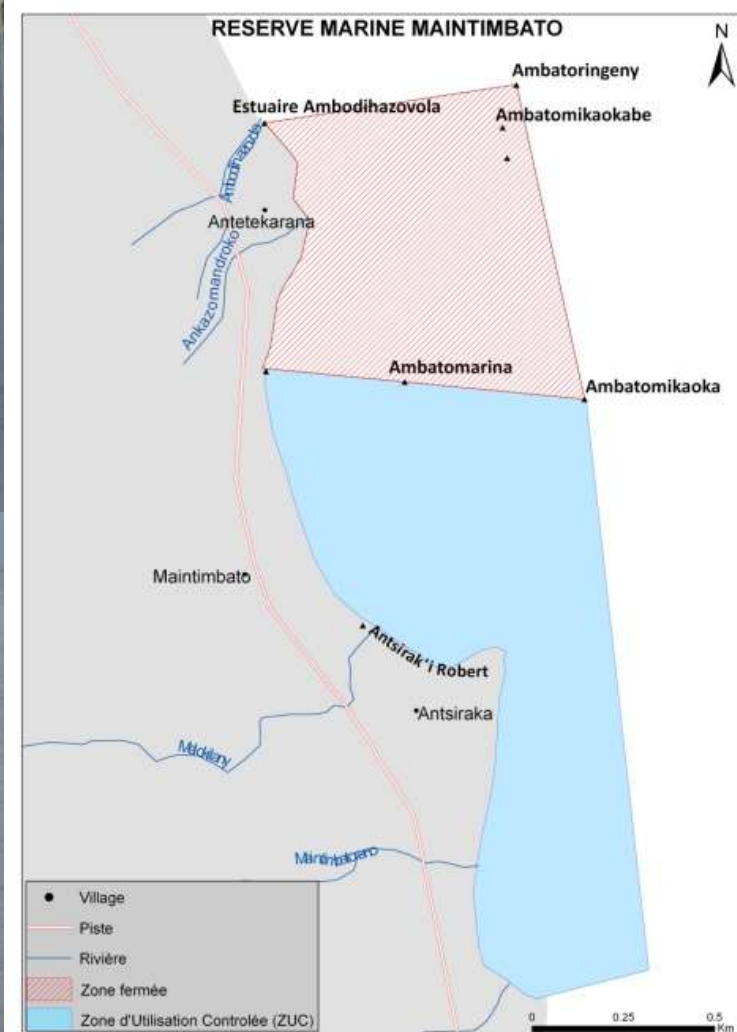
- Appui WCS: 261,782 hectares d'AMP dont 90% LMMA
- Analyse vulnérabilité à l'échelle de l'AMP



Version: Jun-2011

Sources: Rebioma; SAPM 2010-12-09; GADM; Blue Ventures











MINISTRE DE L'AMENAGEMENT  
DU TERRITOIRE ET DE  
LA DECENTRALISATION



REGION ANALANJIROFO

Arrêté n° 19 portant interdiction de  
fabrication, vente et détention des sennes de  
plage dans la Région Analanjirofo.

LE CHEF DE REGION ANALANJIROFO

Vu la constitution,  
Vu la loi n° 2004-001 du 17 Juin 2004 relative aux Régions,  
Vu l'Ordonnance n° 93-022 du 04 mai 1993 portant réglementation de la pêche et de l'aquaculture,  
Vu le Décret n° 2004-859 du 17 Septembre 2004 fixant les règles relatives à l'organisation, au fonctionnement et aux attributions des Régions en application des dispositions transitoires de la loi,  
Vu le Décret n° 2007-531 du 11 Juin 2000 portant l'organisation générale des Régions,  
Vu le Décret n° 2009-430 du 19 Avril 2009 portant nomination du Chef de Région d'Analanjirofo,  
Vu le Décret n° 2011-653 portant nomination du Premier Ministre,  
Vu le compte rendu des événements Survenus dans la zone d'activité de la Plate-forme de concertation pour le Développement durable de la baie d'Antongil en date du 22 Août 2011.

ARRETE

Article premier: -La fabrication, la vente et la détention des sennes de plage sont formellement interdites dans la Région Analanjirofo.

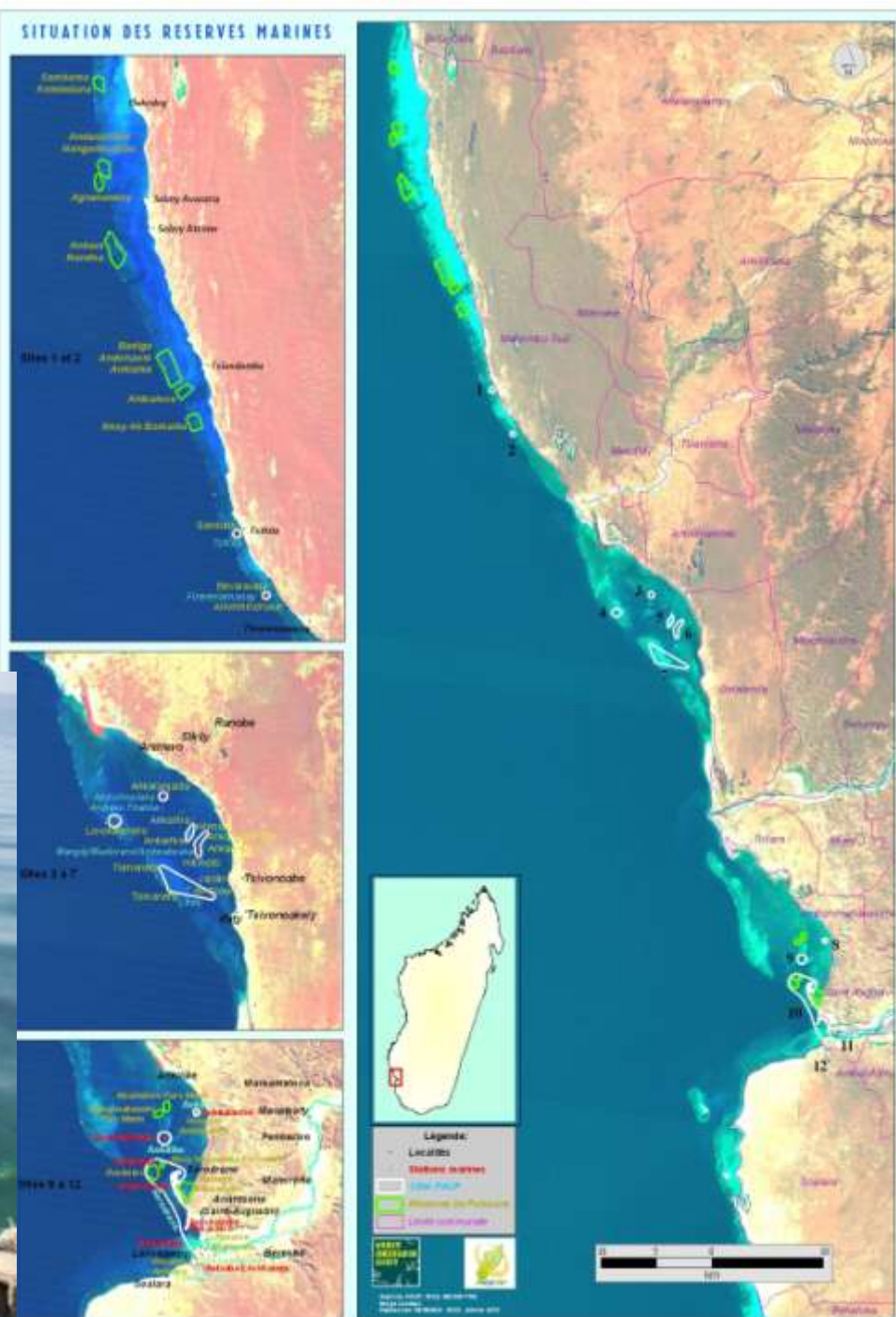
Art.2: -A quelque stade que ce soit, les sennes de plages seront saisies et détruites par un comité ad hoc érigé au niveau de chaque District.

Art.3: Le présent arrêté est enregistré, publié et communiqué partout où besoin sera.

Fait à Fénérive-Est, le 17 Novembre 2011



# Regional octopus seasonal fishing closure





# Watershed management



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Build adaptive  
capacity





Building adaptive  
capacity



Strengthening community groups responsible for managing resources (PCDDBA, LLMA committee etc.)





# Training



# Adaptive management





# Merci



## MACARTHUR

The John D. and Catherine T. MacArthur Foundation

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CONSERVATION  
SOCIETY**