

# Status of Coral Reef Monitoring in Kenya

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26<sup>th</sup> General Meeting of international Coral Reef Initiative  
Reunion, 12-15<sup>th</sup> December 2011

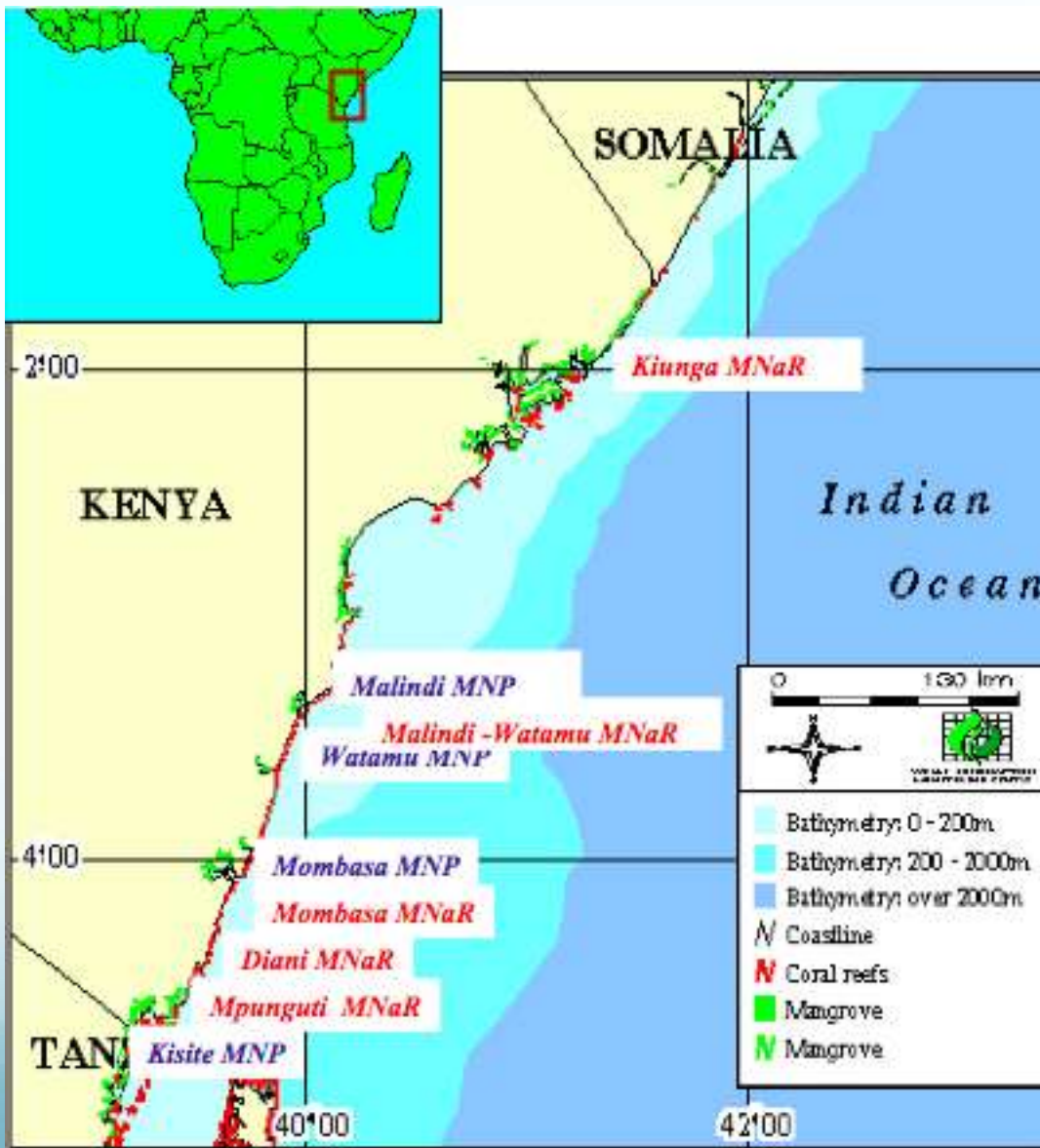
Long-term ecological monitoring of Kenya's coral reefs started in 1987.

## **Monitoring sites**

Within protected areas (Malindi Marine National Park, Watamu Marine National Park, Mombasa Marine National Park, Kisite Marine National Park)

Unprotected reefs in Vipingo and Diani Marine National Reserve.

# Distribution of coral reef monitoring sites



Site name	Designation	Size-km <sup>2</sup>	Year
<i>Kiunga</i>	MnaR, UNESCO Biosphere Reserve	600	1980
<i>Mdindi</i>	MNP	6.3	1968
<i>Mdindi-Watamu</i>	UNESCO Biospherereserve	177	1968
<i>Watamu</i>	MNP	32	1968
<i>Mombasa</i>	MNP	10	1986
<i>Mombasa</i>	MNaR	200	1986
<i>Diani</i>	MNaR	75	1993
<i>Kisite</i>	MNP	28	1978
<i>Mpunguti</i>	MNaR	11	1978

## Management categories

**MNP- Marine National Park: No-take areas**

**MNaR- Marine National Reserve: restricted fishing**

# Ecological monitoring

## 1. Key benthic habitat groups

- Hard and soft coral
- Seagrass
- Algae (fleshy, turf, calcareous, coralline)

## 2. Key species

- Finfish, density, biomass and diversity
- Invertebrates especially sea urchins, density, biomass and diversity

## 3. Key processes

- Predation on sea urchins
- Herbivory by fish and urchins
- Outbreaks such as diseases, corallivores etc
- Bleaching surveys

## 4. Temperature and water flow

# Monitoring partnerships

Monitoring of coral reefs in Kenya constitute part of Global Coral Reef Monitoring Network.

Partners involved in monitoring include:

- Kenya Wildlife Service
- Wildlife Conservation Society
- Coastal Oceans Research & Development (CORDIO) East Africa
- Global Vision International (gvi) Kenya
- Kenya Marine and Fisheries Research Institute.

# Engagement in international efforts

Project title/ partners	Objectives	Expected out puts
<p><b>Western Indian Ocean - core biodiversity region. Is there a western Indian Ocean "coral triangle"?</b></p> <p>CORDIO- EA, University of Cape Town, South African Environmental Observation Network (SAEON)</p>	<p>To determine the relative health of reefs in different countries of the WIO and how they have been affected and are responding to climate change which is causing wide scale coral bleaching and mortality.</p>	<p>Management recommendations that are directly relevant to fisheries management and conservation planning to mitigate the effects of climate change on coral reefs.</p>
<p><b>Incorporating reef fish spawning aggregations into optimal design of no-take fisheries reserves.</b></p> <p>CORDIO-EA, Seychelles Fishing Authority, KMFRI, Institute of Marine Science (Zanzibar)</p>	<p>To strengthen fisheries management and hence coral reef resilience to climate change in the Western Indian Ocean.</p>	<p>Strengthen community-based collaborative fisheries management &amp; government led fisheries management.</p>

# Engagement in international efforts

Project title/ partners	Objectives	Expected out puts
<p><b>Adapting to climate variability</b></p> <p>CORDIO-EA, Kenya            Meteorology Dept,            University of Cape Town</p>	<p>To develop tools for building social adaptation to climate change, on time scales relevant to peoples' daily lives based on predictions of the risk of climate impacts on this time scale.</p>	<p>Predict risks, assess social vulnerability, identify and support opportunities for adaptation</p>
<p><b>Measuring ecological resilience and coral bleaching forecasts</b></p> <p>CORDIO-EA, IUCN and            The Nature Conservancy</p>	<p>To develop the coral reef resilience survey Protocols to be used for assessing &amp; managing climate change impacts on coral reefs</p>	<p>Production of regional bleaching alerts since 2006 (<a href="http://www.iucn.org/cccr">www.iucn.org/cccr</a> and <a href="http://www.cordioea.org/bleachingalert">www.cordioea.org/bleachingalert</a>),</p>
<p><b>Coral reefs and climate change project</b></p> <p><b>Wildlife Conservation Society, Nairobi Convention</b></p>	<p><b>To determine the reef ecosystem health in Kenya, Tanzania, Mozambique,, Madagascar and Comoros</b></p>	<p><b>Model on coral reef vulnerability to climate change in the WIO</b></p> <p><b>A test for coral reef resilience</b></p>

<b>The Seventh WIOMSA Scientific Symposium (<a href="http://www.wiomsa.org">www.wiomsa.org</a>):</b>	<b>Regional scientific symposium held in Mombasa on the 24<sup>th</sup> to 28<sup>th</sup> Oct.</b>	<b>Enhance information exchange on marine research in the WIO</b>



# National initiative

## Kenya Coastal Development Project (KCDP)

Promote an environmentally sustainable management of Kenya's coastal and marine resources by strengthening the capacity of existing relevant government agencies and by enhancing the capacity of rural micro, small and medium-sized enterprises in selected coastal communities.

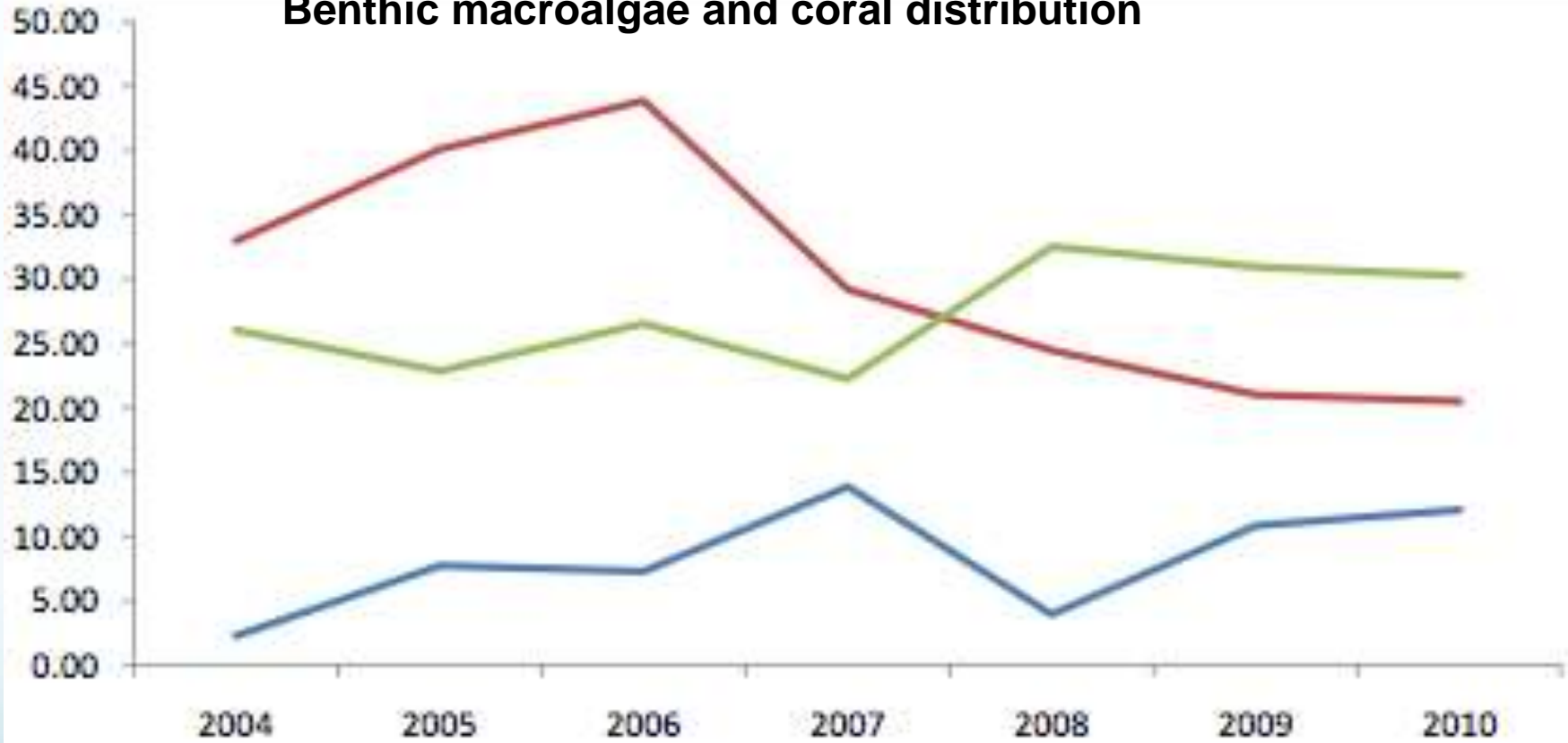
Project components include:

- sustainable management of fisheries resources;
- sound management of natural resources;
- support for alternative livelihoods; capacity building, monitoring & evaluation System, and communication.

The **national coral reef conservation strategy** will be developed within the framework of this project

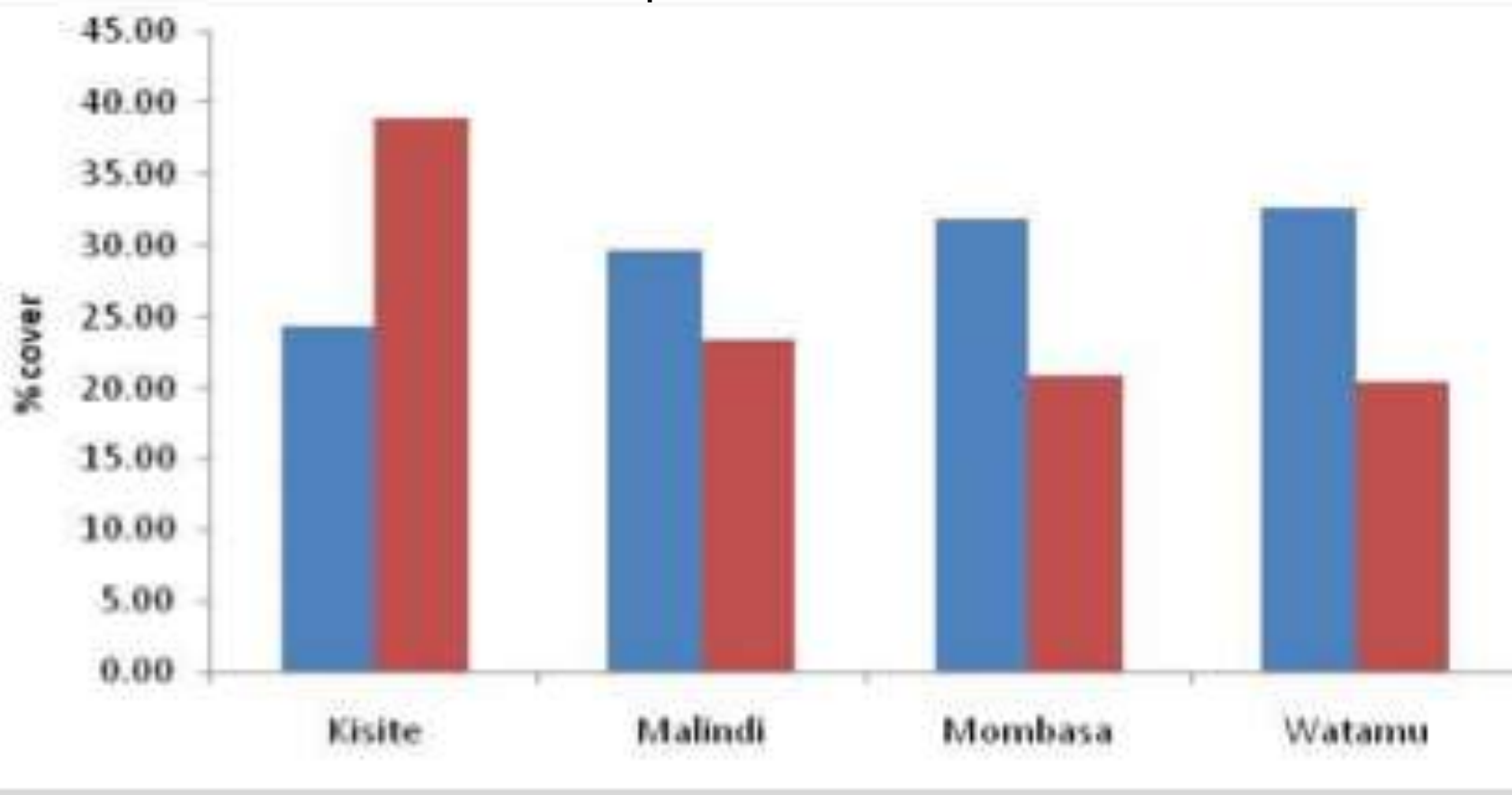
# Some Key findings on coral reef monitoring (2004-2010)

**Benthic macroalgae and coral distribution**



Mean percentage cover of Algal turf (top line), hard coral (middle line) and Fleshy algae (bottom line) from multiple surveys conducted in four different areas Kisite, Malindi, Mombasa and Watamu over a 6 year.

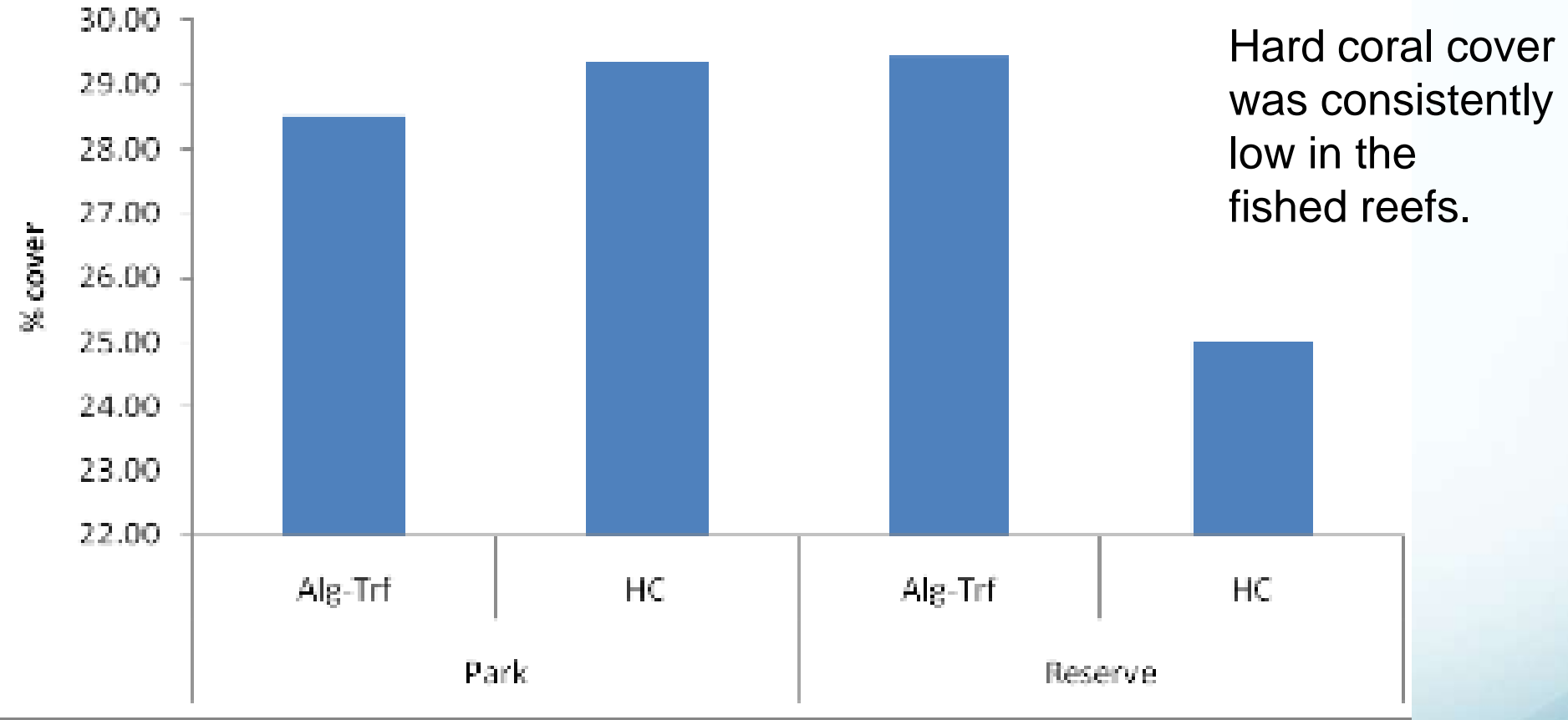
Mean percentage cover of Algal turf (left column) and Hard corals (right column) from all surveys conducted between 2004 and 2010 in four different areas within marine parks and reserves.



Kisite is representative of a healthy reef where there is higher coral cover than algal turf cover

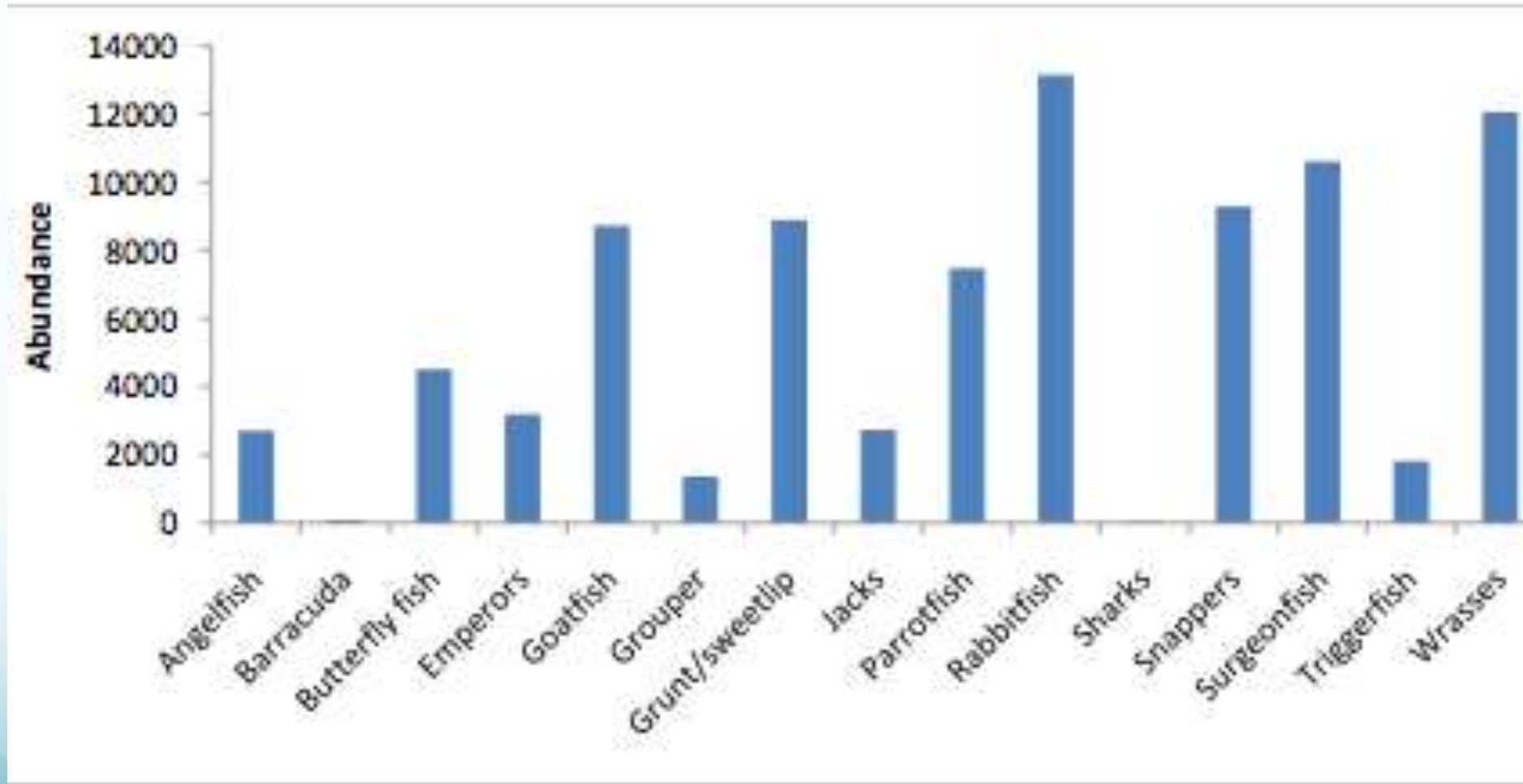
Malindi, Mombasa and Watamu are representative of a deteriorated reef With similar or higher algal turf cover than coral cover .

# Benthic macroalgae and coral distribution: Marine Park vs. Reserve



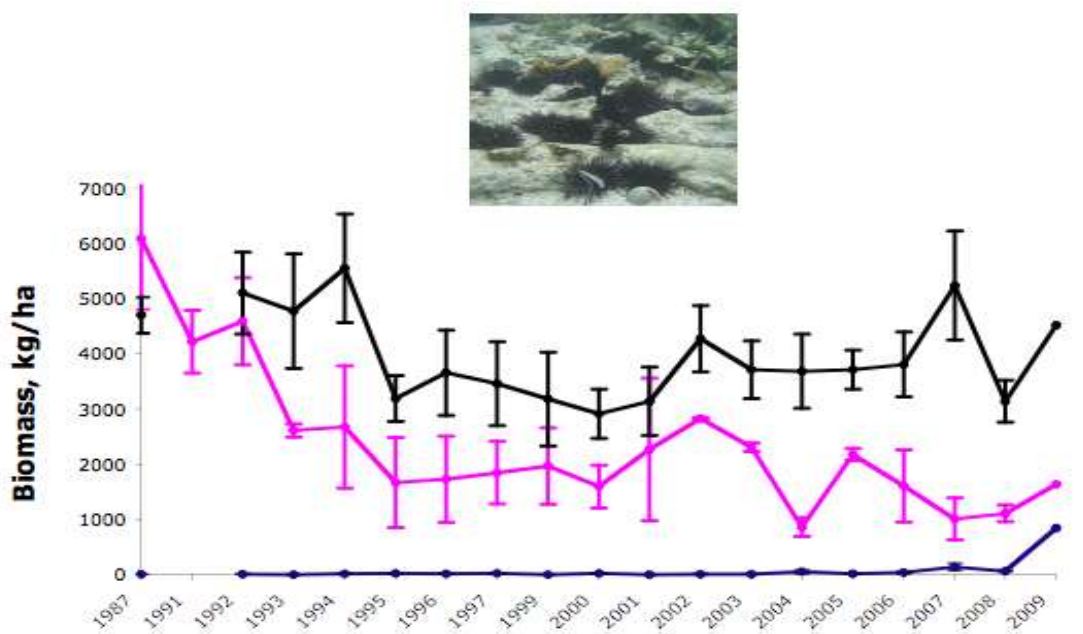
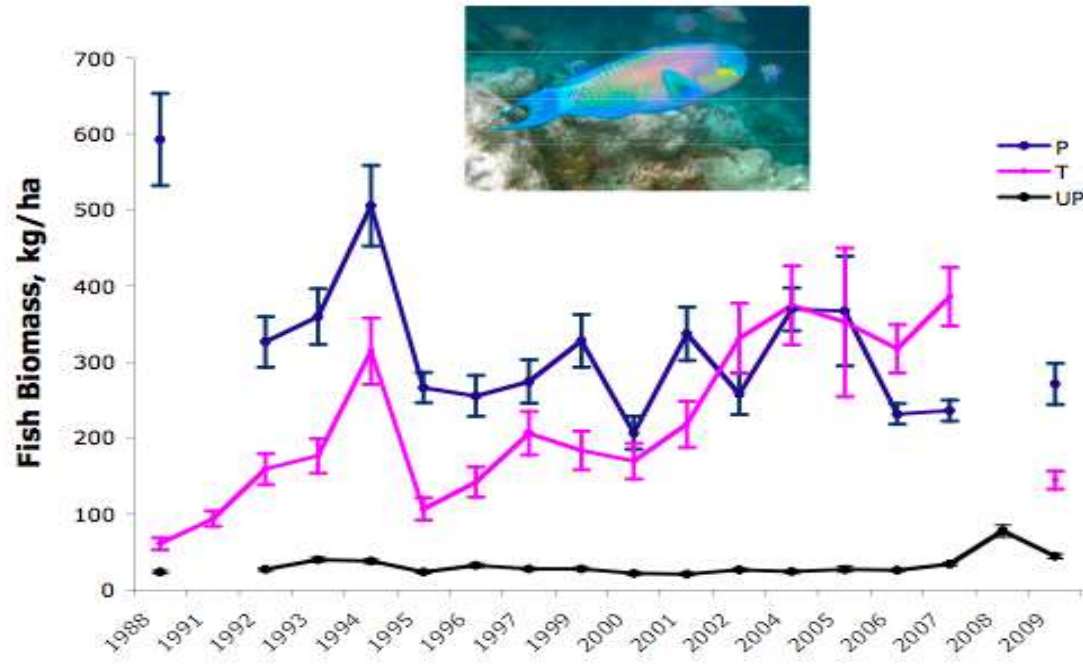
The mean percentage cover of Algal Turf (Alg-Trf) and Hard corals (HC) from all surveys conducted between 2004 and 2010 in three Marine Parks and reserves (Kisite, Mombasa and Malindi).

# Fish abundance



The total abundance of 15 different key reef fish, from all the surveys of four Marine parks and reserves along the Kenyan coast (Kisite, Malindi, Mombasa, Watamu)

# Fin fish & sea urchins biomass in protected and unprotect coral reef areas



## Success on reef monitoring

- Long term data on the status of coral reefs in Kenya is available

## Challenges on reef monitoring

- Lack of adequate resources to conduct the monitoring activities in other non protected sites.
- Lack of adequate trained personelle to carry out regular monitoring.

## Outputs

- Dataset from the long term monitoring work will be published in a book funded by WIOMSA through the MASMA program early next year.
- Scientific journal publications.
- Books and book chapters and Technical reports.

# Acknowledgements

- Kenya Wildlife Service (KWS)
- Kenya Marine & Fisheries Research Institute
- Western Indian Ocean Marine Science Association (WIOMSA)
- Wildlife Conservation Society (WCS)
- CORDIO East Africa
- GVI- Kenya
- Nairobi Convention Secretariat



THANK YOU