Global learning for local solutions: Reducing vulnerability of marine-dependent coastal communities: GULLS

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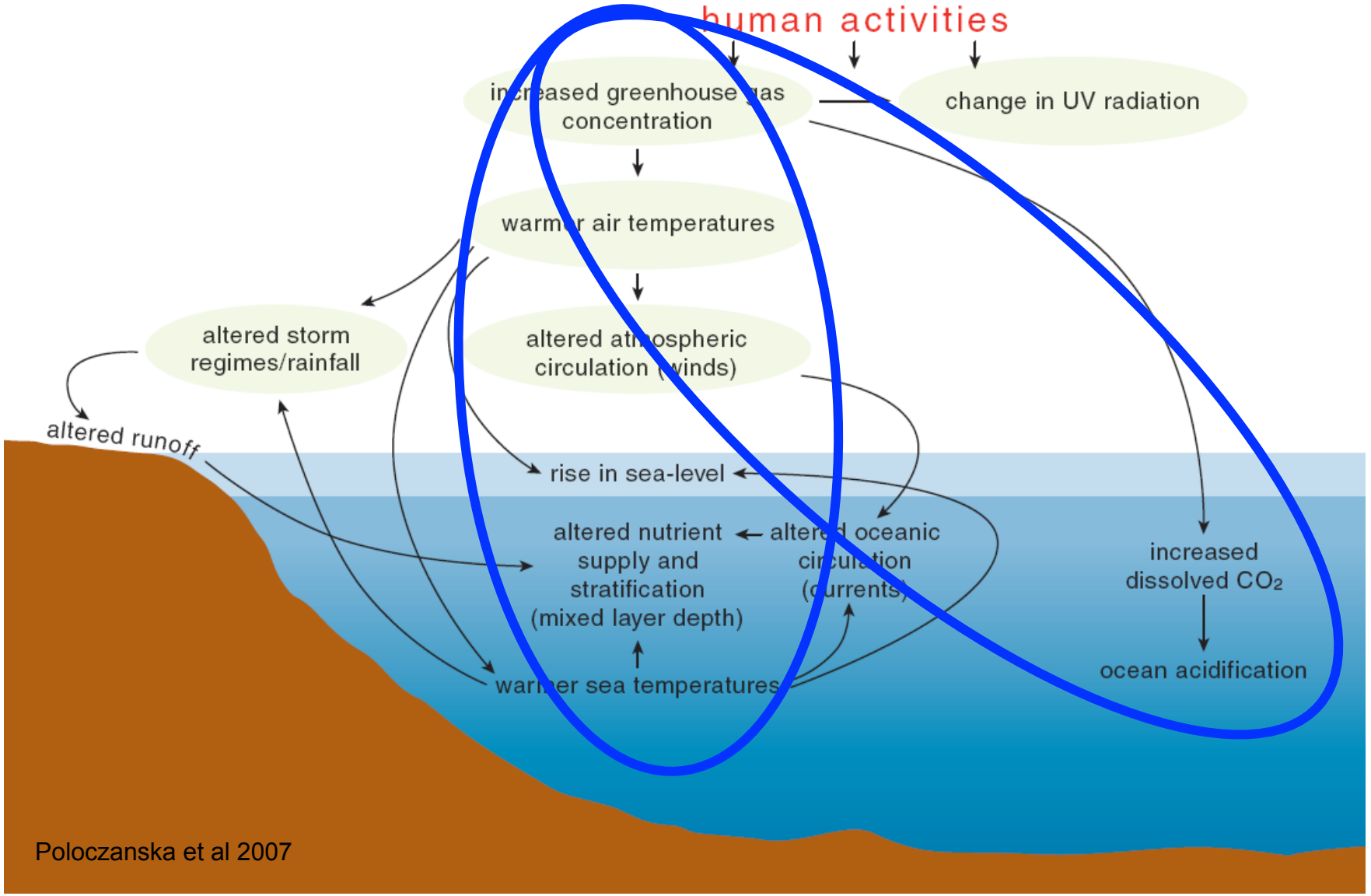
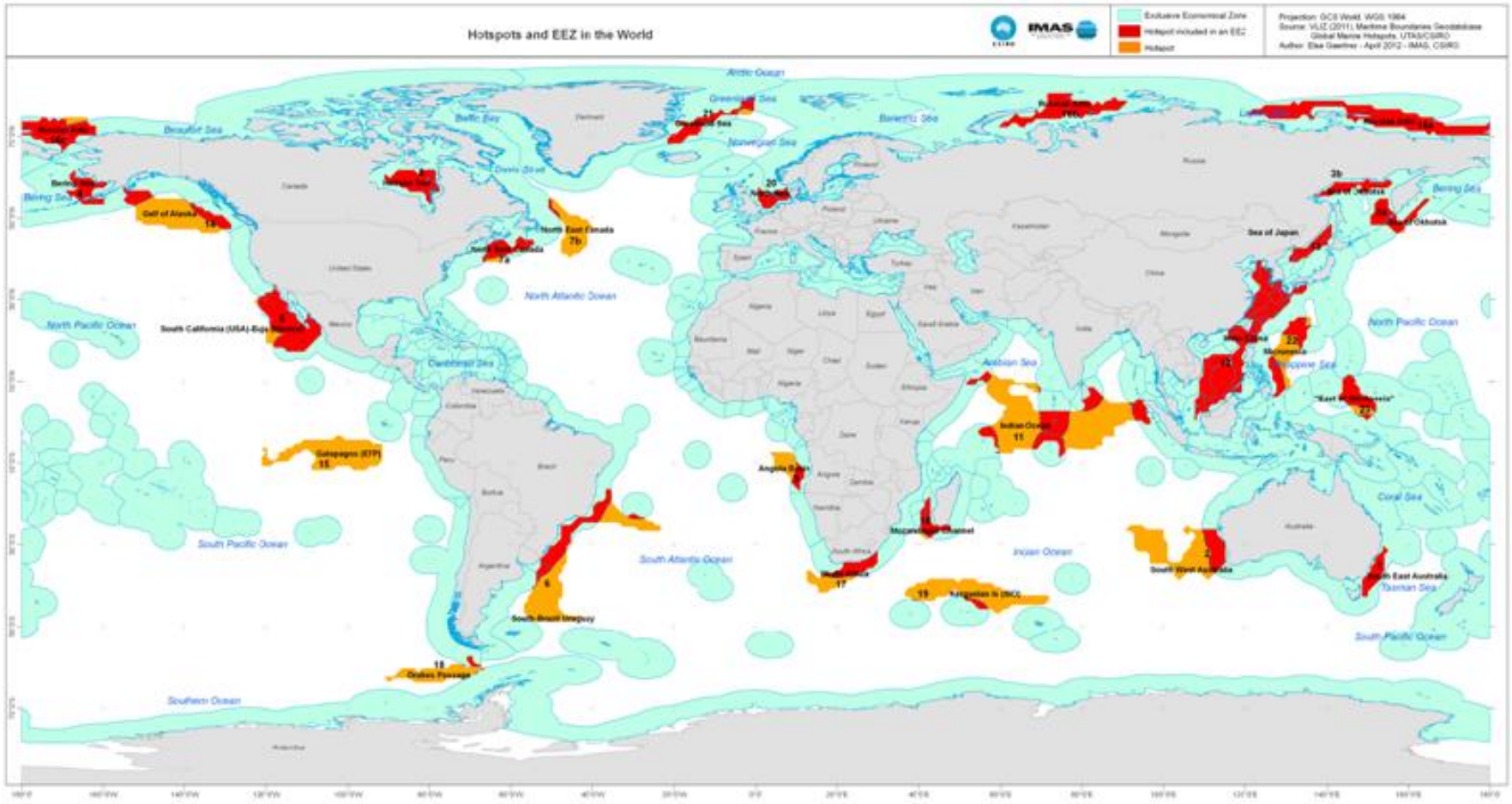
Climate Change Impacts on the Ocean



Poloczanska et al 2007

Global marine hotspots



The GULLS Response

A holistic approach will be developed and applied to five southern hemisphere hotspot regions: Brazil, India, the Mozambique Channel, southern Benguela (South Africa) and South East Australia). The project will deliver a comprehensive set of options to reduce coastal vulnerability and position vulnerable coastal communities for an improved future.

GOAL

This project will contribute to to improving community adaptation efforts by characterizing, assessing and predicting the future of coastal-marine food resources through the provision and sharing of knowledge across regional "hotspots“.

Project objectives

- Build regional skill-sets that can reduce coastal vulnerability by evaluating and characterizing likely impacts,

- Create predictive systems that will inform decision makers about the expected consequences of coastal changes;

- Deliver alternative options in terms of adaptation and transformation within coastal communities; and

- Define the long-term implications of selecting a particular option in terms of economic, social and environmental outcomes.

GULLS Core Activities in Each of the Hotspots

Phase 1

- Assess direct and indirect drivers and observed impacts on biological and human components of coastal systems in each hotspot;
- Using a common VA framework in participatory mode, determine the vulnerability of coastal peoples with regard to climate-related marine food security;
- Exchange visits and training to develop skills and train early career researchers for the in-country work.

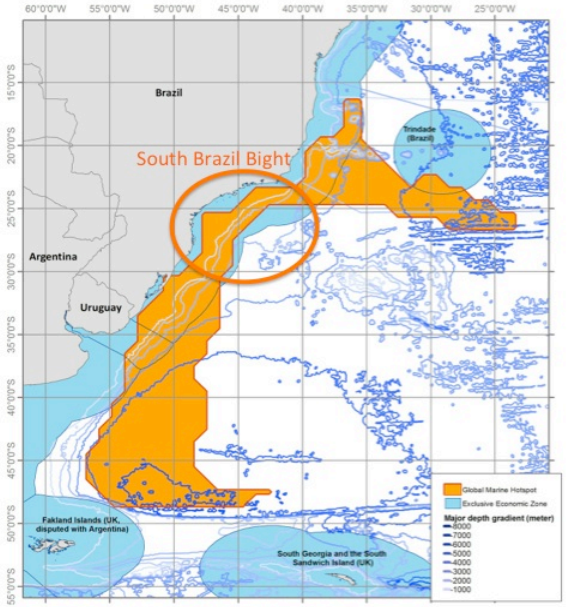
Phase 2

- Develop and apply predictive, integrated frameworks and models to help to develop future scenarios and adaptation options with local communities, managers and policy-makers.
- Develop and disseminate education and communication tools, a vulnerability assessment framework, and options for adaptation and transformation within coastal communities.

The Hotspots

Brazil hotspot

- Potential shifts in distributional range of commercially important species
  - Climatic anomalies, patches of sea overwarming, coastal erosion
- Fisheries are socially and economically importar regional industries
  - Sardine, shrimps, skipjack tuna
- Changes affecting people's livelihoods infrastructure,, fisheries
  - Fishing communities are vulnerable to global change
- Focal work in the hotspot
  - Social vulnerability assessment
  - Small scale and commercial fishers perceptions of the marine environmental change
  - Modelling to detect change, projections, and options to reduce social vulnerability and maintain food security and local seafood access



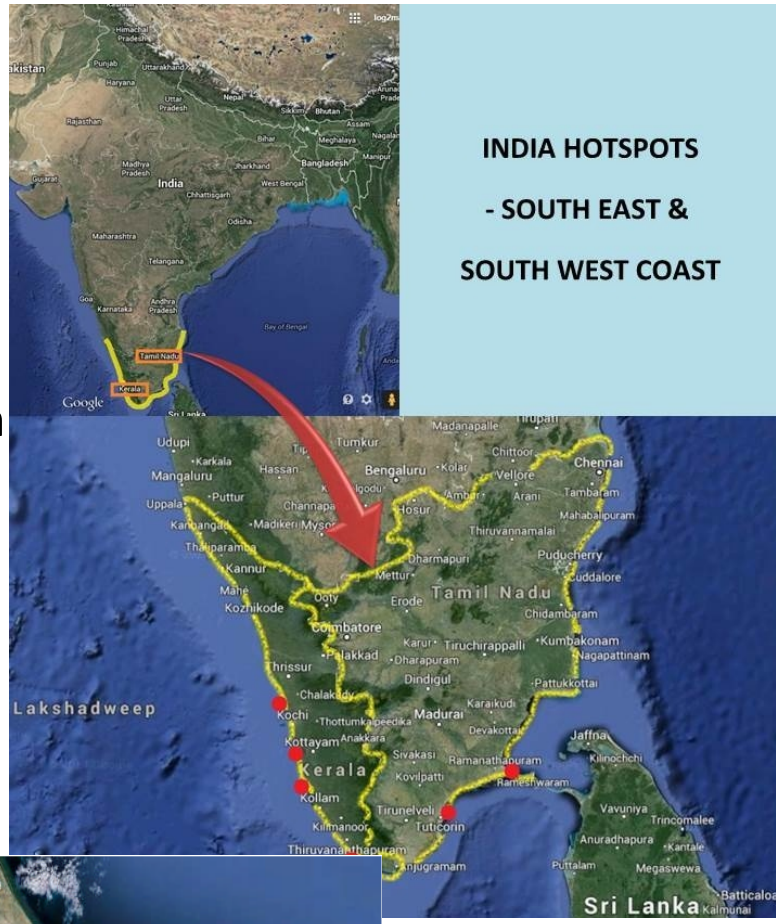
INDIA HOTSPOTS

Southern India- predicted to warm substantially faster than the global average

- Small pelagics extend their boundaries, some species may be found in deeper waters - **Indian Oil Sardine and Mackerel**
- Phenological changes- **thread fin breams**
- Changes in species composition of phytoplankton
- Temperatures have risen by an average of 0.90±0.1ºC per century in the Gulf of Mannar
- Coral Bleaching
- Sea level rise in the Indian seas

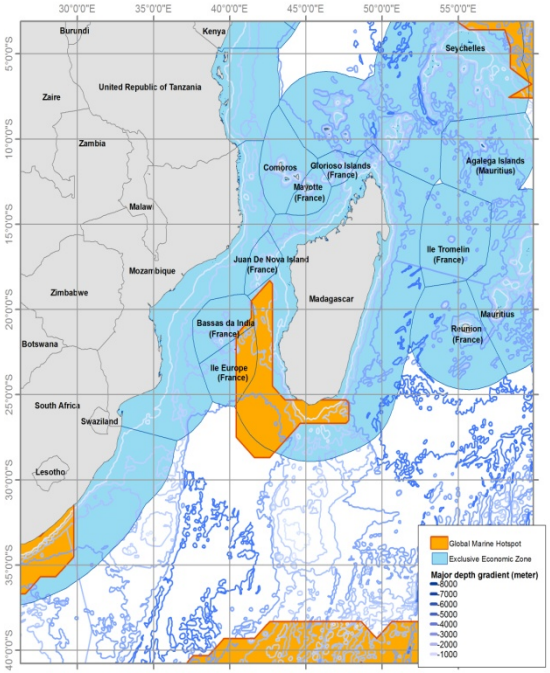
Focal work in the hotspot

- Social vulnerability assessment
- Climate Resilient Village Adaptation and Mitigation Plan
- Climate Informed fishers



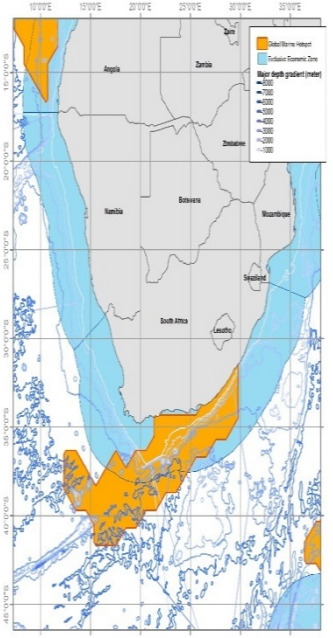
Mozambique Channel

- Covers an area of over 330 000 km^2. This hotspot is found in the Mozambique Channel, with 76% taking in the exclusive economic zone of Madagascar.
- Madagascar's marine environment is an essential source of both food and income
- Coastal communities are vulnerable to climate change impacts on key ecosystems: coral reefs, mangroves, seagrass beds, coastal lagoons.
- Low adaptive capacity – alternative livelihoods
- Focal work in the hotspot
  - ROMS-IBM modelling
  - Climate change model projections
  - Ecosystem model
  - Species vulnerability assessment
  - Socio-economic surveys
  - Adaptation options and recommendations



Southern Benguela hotspot

- Covers the West and South Coast of South Africa (Orange River Mouth to East London), with an area of ~ 220 000 km^2.
- Commercial, recreational and small-scale fisheries are important activities on the region.
- Changes in the distribution of species of ecological and economic importance.
- Overfishing causing major declines in the abundance of non-target species.
- Negative effects on the livelihoods of fishers and communities.
- Medium and high vulnerability of the different fisheries sub-sectors to environmental change and variability.



Focal work on the hotspot

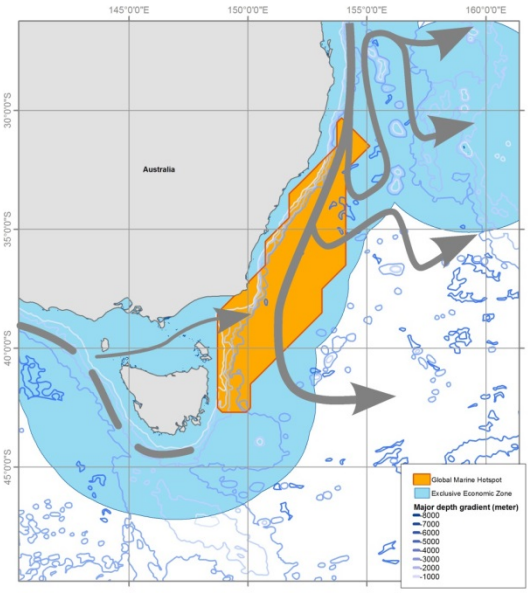
- Ecological and social vulnerability assessments

- Integrated modelling to explore optimal management approaches and other adaptations to reduce vulnerability to future changes

- Socio-economic studies

South-east Australia hotspot

- Many species moving further south
  - Habitats changing too
- Commercial fisheries are important regional industries
  - Abalone, rock lobster, finfish
- Changing species distributions impact on fishing profitability
  - Heightened conflict between commercial and recreational fishers
- Focal work in the hotspot
  - Social vulnerability assessment
  - policy mapping to determine key influencers
  - integrated modelling to assess options to reduce social vulnerability and maintain food security and seafood access



Methods and Approaches

Ocean models, system models and risk assessments

1. DYNAMIC MODELS

Climate drivers
e.g. Biophysical model

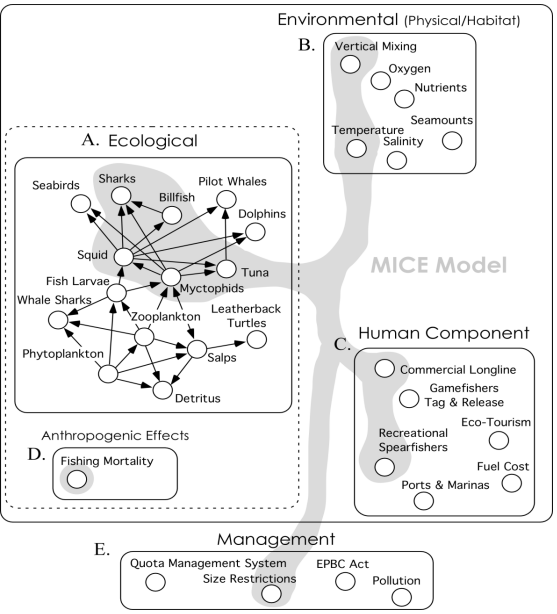
OBJECTIVES RE MANAGEMENT

Conceptual / Understanding

Strategic decision tools
e.g. Whole ecosystem models such as Atlantis, EwE

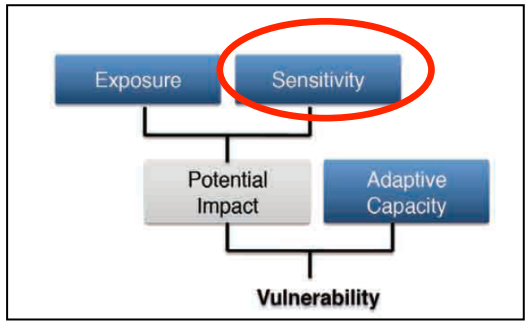
Tactical decision tools
e.g. Extensions to stock assessment models, Models of Intermediate Complexity (MICE)

APPLICATIONS



2. ECOLOGICAL RISK ASSESSMENTS

e.g. Approaches building on Ecological Risk Assessment for Effects of Fishing (Hobday et al. 2007)



Estimate sensitivity of species to climate drivers based on ABUNDANCE, DISTRIBUTION and PHENOLOGY

Conducted for SE Australia, being repeated in South Africa and Western Indian Ocean and possibly adapted for India and Brazil

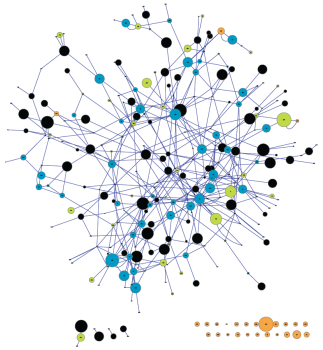
(as per Pecl et al accepted, Climatic Change)

Social models and approaches

- Expanded social vulnerability assessments (VA) in 3-5 coastal communities per hotspot

- Establish community objectives and adaptation options

- Model indicator relationships between community objectives and vulnerability indicators - Bayesian and qualitative models



- Supply chain analysis and mapping to scale up from community to regional level & identify adaptation options

- Summary analyses – cross comparisons of modelled relationships and adaptation options among hotspots

Education and Outreach – Empowering Costal Communities

citizen SCIENCE

Informing local communities about the ocean and environmental impacts of climate change on marine resources. We employ a wide range of education and outreach programs at each of the Hotspots, including professional development to local school teachers and academics through workshops, citizen science programs, and development of locally relevant scientific educational resources

Synthesis and formulation of options for management and policy

Comparison across hotspots, and in-depth within each hotspot, based on social techniques, vulnerability assessments, and model simulations will reveal for;

- Conservation – options to manage preservation conflict with resource use
- Harvest – what are options for reducing vulnerability of resource users
- Coastal development – what compromises may be need to support both conservation and harvest, and still allow for “development”

- What agencies are the influencers in each region?

Conclusions and Next Steps

- Project is on track to achieve goals of Phase 1 and preparations already underway for Phase 2.
- The partnership is working well, with excellent cooperation and synergies. Cross-over sharing of expertise is a major strength. Demonstrates value of Belmont approach
- More could be achieved with higher levels of funding, including ear-marked funding for project oversight and international coordination. One country has not yet received its funding.
- Additional funds are being sought and would help project to reach full potential.
- Second GULLS workshop scheduled for Brazil, March 2015. Will be an important opportunity for checking progress, reinforcing cooperation and ensuring on track for successful completion.