

**Putting Two and Two Together:
Coastal Conservation and Restoration to Prevent Climate Change Disasters
Final Report Summary – Anuradha Rao, Gordon Foundation Global Youth Fellow 2006-2007**

1. Summary of my policy of investigation

The crux of my fellowship research over the last year has been to learn how coastal ecosystems can be conserved and restored to prevent disasters due to climate change. My main argument is that a major strategy to mitigate the effects of increased storm frequency and intensity, storm surges, sea level rise and shoreline erosion (all manifestations of climate change on the coasts), and to help people adapt to a changing climate should be to restore natural coastal barriers – ecosystems that break waves, block wind and absorb rising sea level. These natural barriers include coral reefs, mangrove forests and seagrass – all of which are currently under threat globally. I have been focusing my research on the latter two, with case studies on mangrove restoration in Ghana and seagrass conservation in Newfoundland.



Seagrass



Mangroves

To me, the link between coastal ecosystem integrity and climate change disaster mitigation is obvious. Unfortunately, it does not seem to get much, if any, attention except now in areas that were devastated by the 2004 tsunami. This link is something we should be increasingly concerned about given the global pattern of coastal degradation, recent coastal disasters such as the New Orleans floods, and the number of people who live on or near coasts – some 3 billion.¹ My message to the world is that we need to put two and two together and act now to conserve and restore those coastal ecosystems that can protect people worldwide, before disaster strikes again.

2. Summary of activities conducted

The beginning...

I had originally hoped that I could simply fit into existing efforts. After an intense search for literature and people concerned with coastal restoration and its links to climate change adaptation, however, I concluded that the issue – or this approach to it – remains largely unaddressed. Below I describe my two case studies.

Seagrass mapping and conservation in Newfoundland...

After discussions with several researchers in Newfoundland, my current place of residence, I narrowed my domestic focus to the study of eelgrass, a type of seagrass. Eelgrass grows underwater in shallow, sheltered areas of the ocean near a stream outflow. Although largely unknown, eelgrass beds are important because they stabilize sediment and therefore prevent shoreline erosion. They are also economically important because they provide shelter, as well as nursery and feeding grounds to juvenile fish, including the infamous Atlantic cod.

While restoration projects exist for seagrass elsewhere in the country and in the world, in Newfoundland there is little knowledge of the existence, let alone the importance of seagrass. Conservation and restoration programs are practically non-existent; in fact, before I started my work there was no comprehensive map of where eelgrass grows around the island. Therefore, I had to take several steps backwards and start with two very basic questions: Where does this grass grow? What might threaten its health and survival?

I compiled existing information about eelgrass locations around Newfoundland and looked myself for eelgrass in areas that had not yet been covered. Although this is a big job covering a huge area, and there was not enough time to fill in all the gaps, I have compiled the most comprehensive map so far of eelgrass in Newfoundland.

Another component of the domestic aspect of my research has been awareness raising. By writing articles for

the provincial newspaper and different environmental newsletters, I have informed people across the province about the importance - and relevance to their lives - of this otherwise unknown plant, and have sought their input regarding eelgrass locations. I have also shared my map and information about potential threats to eelgrass habitat with researchers at Fisheries and Oceans Canada, the provincial Department of Environment and Conservation and Memorial University of Newfoundland, as well as with non-governmental organizations, societies and the media. I hope that through these efforts people will know to exercise caution when in the vicinity of these important and sensitive areas.

To gain additional experience, I participated in eelgrass mapping field work with researchers in British Columbia.

Mangrove restoration in Ghana...

Mangroves, trees that live in the salty waters of the tropical coast, also stabilize shorelines and block wind and waves. I found several people and organizations in Ghana who have been working on mangrove restoration. I visited Ghana from March to May 2007 to visit these people, observe and learn from restoration projects, document any connections they have noticed between mangroves and climate change, and determine what I could do to help mangrove restoration efforts in the country.

After visiting projects in 6 villages on 3 different parts of the Ghanaian coast, visiting additional areas in which mangroves were either in abundance or severely degraded, and seeking recommendations from local project leaders, I decided that my most effective contributions would be to: 1) compile a list of potential funding sources for mangrove projects in Ghana; 2) connect my Ghanaian contacts, including the Resource and Environment Development Organisation (REDO)², with relevant organizations in other countries, as well as with global networks; and 3) share mangrove stories from Ghana with the international community so as to increase exposure of the issue and the communities working on it. I have done all of the above. In particular, I have connected REDO with my mentor in Canada, Dr. Ratana Chuenpagdee, to produce an awareness booklet on mangroves. I have also had two articles printed in international newsletters.

3. Summary of key findings/learnings

I have learned that healthy coastal ecosystems are vitally important to human physical, food and economic security. Awareness of the importance of these ecosystems and the threats to them, particularly in the face of a changing climate, is crucial both for those who live on the coast and those whose actions and market demands might directly or indirectly impact these ecosystems.

The importance of being eelgrass

“The first time I did the calculation, I had to do it again because I didn’t believe it.”
Robert Gregory, Fisheries and Oceans Canada, St. John’s, Newfoundland

What Dr. Gregory is referring to is his finding that eelgrass beds provide such good feeding grounds and protection from predators that young cod living in them are 17,000 times more likely to survive than young cod living outside of them! The status of Atlantic cod has largely determined the fate of Newfoundland and Labrador, however in my experience many people in this province – including fishers – know little to nothing about the existence of eelgrass, let alone its importance to their shorelines and their economy.

What do fish and grass have to do with climate change, and why should anyone care? Eelgrass abundance has been declining in many places, but in Newfoundland at the coldest limit of its range, it appears to be increasing in some areas. As the climate warms, the sea warms, the range of eelgrass shifts northward, and frequent and stronger storms uproot existing or more exposed eelgrass beds, the eelgrass in Newfoundland may be important in maintaining a source population from which the plant can continue to grow. And as described above, not only does eelgrass mean stable shorelines, but eelgrass means fish, and fish are key to coastal economies.



By visiting an eelgrass mapping project in British Columbia, I learned how stewardship, community and First Nations groups can be involved in mapping and conservation.

Threats: Eelgrass is threatened by anything that uproots it, for example storms, anchoring, dragging and dredging; or by reductions in light levels in the water, for example through sewage or other water pollution.

Mangroves for life

“[A storm this year] caused havoc in the village where there was a break in the mangroves...roofs were blown off of the houses. My own roof was blown off.... In the areas behind the mangroves there was no problem.”
Development Chief Joseph Obir Taylor, Nsuekyir village, Winneba, Ghana

This quotation from one of the people I visited in Ghana demonstrates that mangroves do protect communities from storms. As further illustration, I learned that communities in India that were behind mangrove forests suffered less damage by the 2004 tsunami than did those that were not behind mangrove forests.³

My most unexpected learning was about how integrated these plants are into people’s lives, what hidden values they have and how much their health is directly linked to the health of the communities that live in their vicinity.

“Mangroves are important. They help us to feed ourselves.”
Chief Obir Tetteh III, Sankor village, Winneba, Ghana

From fish and shellfish to medicines, from building materials to dyes, mangrove forests are a horn of plenty for coastal communities. Because of the habitat mangroves provide for birds and other wildlife, some communities plan to use them for eco-tourism. When the mangroves were healthy at Nsuekyir, there were no malaria-carrying mosquitoes in the village; when they were over-harvested, mosquitoes were released into the village.

Community members told me that mangroves also keep the land from drying out, and maintain lower air and water temperatures. By maintaining cooler air, says Chief Tetteh of Sankor village, healthy mangrove forests will prevent people from succumbing to sickness as the climate warms.

Unfortunately, not all communities have learned these benefits of mangroves, nor have many governments.

Threats: Mangroves around the world are being destroyed by human activities such as over-harvesting, coastal developments and shrimp aquaculture. Mangroves once covered 75% of tropical and subtropical coastlines, but less than half of this remains, and half of this remainder is degraded.⁴

4. Possible follow-ups

The work has just begun.

The eelgrass map must be completed – both in terms of comprehensiveness and detail – and disseminated more widely. This is a huge task. I am currently in discussion with several researchers about the development of an on-line community eelgrass mapping tool and related training for community groups in Newfoundland.

I am looking for media to publish 3 articles I have written about mangrove restoration in Ghana. I am also in discussion with a local institute regarding their possible collaboration with the organizations I visited in Ghana.

I would like to publish something about coastal restoration and climate change in a prominent medium, so as to really get the message out to the public and to policy-makers. I am also exploring the idea of getting my messages across through children’s books and visual art. My research will be posted on-line as part of the International Coastal Network website, which is currently under development by Dr. Chuenpagdee.



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¹ Approximately 3 billion people live within 200 km of a coastline, according to the United Nations Environment Programme. 2005. Global environment outlook GEO yearbook 2004/5.
<http://www.unep.org/geo/yearbook/yb2004/072.htm>

² <http://www.redoghana.org/>

³ Danielsen, F., Sørensen, M.K., Olwig, M.F., Selvam, V., Parish, F., Burgess, N.D., Hiraishi, T., Karunakaran, V.M., Rasmussen, M.S., Hansen, L.B., Quarto, A. and N. Suryadiputra. 2005. The Asian tsunami: a protective role for coastal vegetation. *Science* 310: 643+.

⁴ V.P, Upadhyay, R. Ranjan, J.S. Singh. "Human-mangrove conflicts: The way out," *Current Science*, 83:11 (2002), pp. 1328-36.



Mangroves and seagrass
(photo © Norbert Wu Productions)

