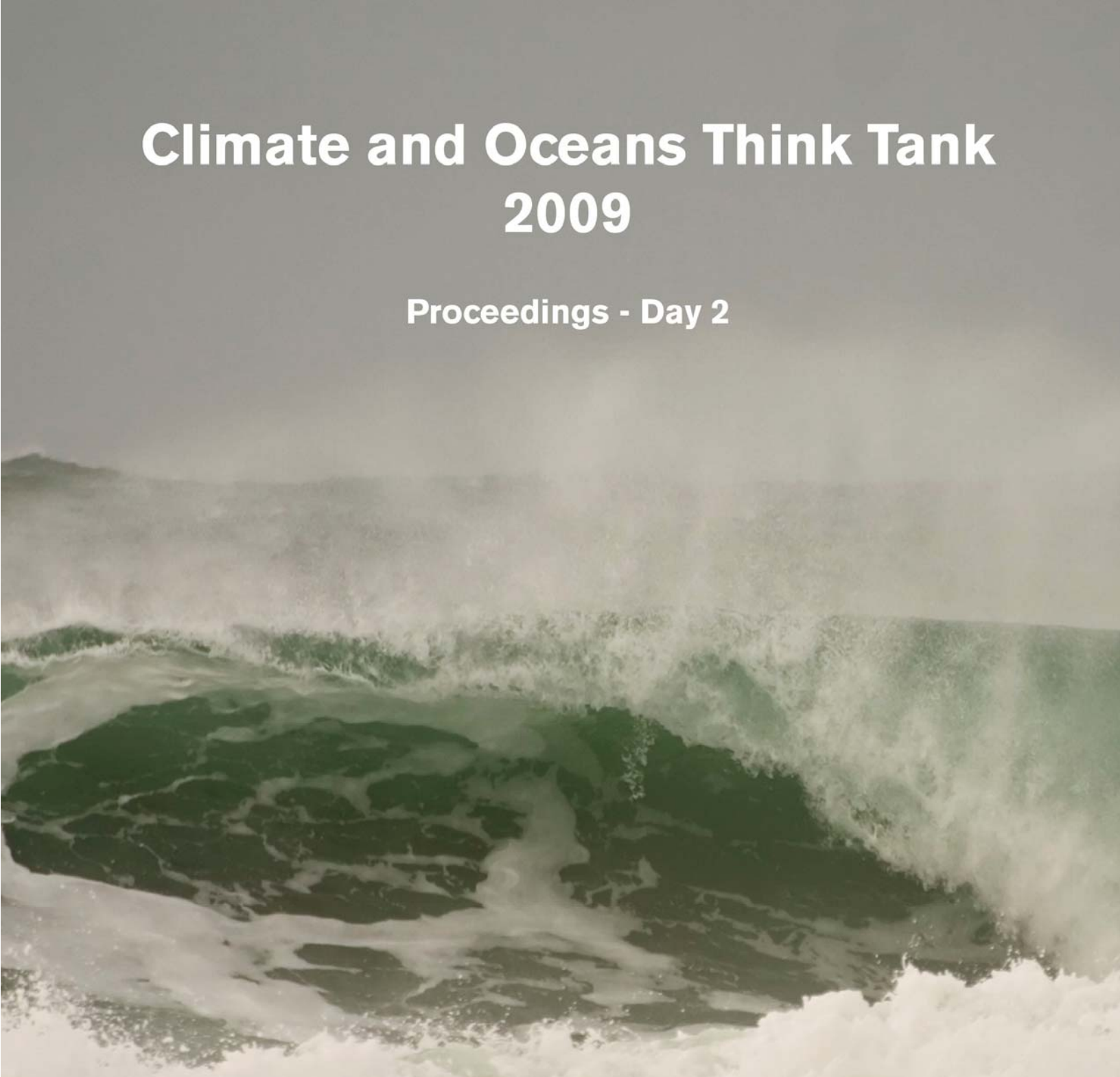
Climate and Oceans Think Tank 2009

Proceedings - Day 2



LIVING OCEANS SOCIETY

Healthy Oceans. Healthy Communities.

Healthy Oceans. Healthy Communities.
www.livingoceans.org

CLIMATE AND OCEANS THINK TANK 2009

PROCEEDINGS

DAY 2- FROM SCIENCE TO SOLUTIONS

These proceedings provide a summary of the presentations that were given at the Climate and Oceans Think Tank, hosted by the Living Oceans Society in March 2009. For more information on any of the subjects please see: www.livingoceans.org/programs/energy/climate_change/resources.html

1. **Situational Analysis - Oonagh O'Connor, Living Oceans Society**
2. **PNCIMA Climate Change Project - Hussein Alidina, World Wildlife Fund, Canada**
3. **Presentation 6: Dr. Tom Okey, Director of Aquatic Sciences, West Coast Vancouver Island Aquatic Management Board**
4. **Discussion: Mitigation**
5. **Discussion: Adaptation**

Living Oceans Society would like to acknowledge the assistance of Mountain Equipment Co-op, the Vancouver Foundation and the Ocean Management Research Network for funding the Climate and Oceans Think Tank.

Situational Analysis - Oonagh O'Connor

There are a number of existing initiatives that may be useful to consider before putting forward policy.

1. Recommendations were submitted to the Provincial Climate Action Team (CAT), signed by the David Suzuki Foundation (DSF), Living Oceans Society (LOS), Georgia Strait Alliance (GSA), Canadian Parks and Wilderness Society (CPAWS), and others. The group put forward broad context steps that need to be taken to protect the Pacific Ocean in the face of climate change. The focus of the CAT is on mitigation, and this was the focus of the recommendations as well. For example, one recommendation called for the establishment of a network of marine protected areas.
2. CPAWS submitted a letter to British Columbia Premier Gordon Campbell that was signed by 25 ENGOs, urging the provincial government to look at adaptive measures and make investments into leadership in adaptive technology.
3. The Monaco Declaration, signed by 155 scientists from 26 countries, urges policymakers to take action to address ocean acidification by asking government to launch four specific initiatives to address ocean acidification:

    - Increase research
    - Evaluate socioeconomic impacts
    - Improve communication between scientists and policymakers
    - Cut CO_2 emissions drastically

4. There is an opportunity for those groups that are working toward emission reduction to use impacts on Oceans in part of their communications strategy.
5. PNCIMA (Pacific North Coast Integrated Management Area) is the marine planning process for the North and Central Coast of B.C. PNCIMA provides the opportunity to ensure planning is done in a way that considers climate change.
6. Political will and public awareness are currently working in favour of change. For example, President Obama, with intentions for a different direction around climate change policy, is providing much needed leadership and a window with the public and leaders of the world. The group noted that stronger targets are needed than those proposed by Obama.
7. B.C. signed an MOU with the Governors of Alaska, California, Oregon and Washington, called the Pacific Coast Collaboration about ocean health and working towards climate change solutions.
8. Copenhagen 2009 - a message could be composed to send to Copenhagen on behalf of conservation groups concerned over the impacts of climate

change on the ocean. Amongst groups in the room, World Wildlife Fund, David Suzuki Foundation and Greenpeace are planning to attend.

Other ideas and comments from the groups included notation of the Pacific Coast Collaborative between Washington and B.C., the Western Climate Initiative hosting an Oceans Task Force, and a large national collaborative initiative run by NRCan focused on adaptation. Groups within government are beginning to talk and plan for adaptation. Oregon, Washington, California, and Alaska are working on an MOU on Climate Change and Oceans that will soon be in effect. NASA and Cisco are doing good research and have data sets and ocean based services.

Climate Change and implications for the PNCIMA

Hussein Alidina, on behalf of WWF and CPAWS

CPAWS BC and WWF Canada undertook a research project that looked at Marine Climate Change Adaptation. The project was funded by the Gordon and Betty Moore Foundation and is being completed in association with the David Suzuki Foundation, Living Oceans Society and the Sierra Club of BC.

The project synthesizes relevant marine climate information that can be used within a planning process on the Pacific Coast known as PNCIMA. PNCIMA (Pacific North Coast Integrated Management Area) is an emerging planning process for oceans that will involve a number of stakeholders in oceans management. It provides an opportunity where marine climate adaptation may be considered as part of resource management and planning.

The goals of the project are to:

1. synthesize knowledge of climate change impacts in the Pacific Coast of Canada and particularly in the PNCIMA region;
2. examine the potential adaptation actions that may be necessary for this region, where the focus is on ecosystem adaptation and not exclusively human adaptation; and,
3. conduct an institutional analysis to determine how actions defined may be implemented. The preference is to avoid inventing new institutions for climate change adaptation and instead, enable current institutions in place to undertake climate change adaptation planning and actions as part of their existing mandates (mainstreaming).

There has been a large team working on the project. The group is currently working on a synthesis report, adaptation actions, and the institutional analysis. The report will likely be available later this year for the five organisations to use in their work. The key thing for moving forward is a framework and principals for adaptation actions.

Presentation 6 - Dr. Thomas A. Okey

From Science to Policy: Seeking a Framework for Managing Marine Climate Change Impacts

Cumulative impacts from a variety of stressors related to human activities, including climate change, are affecting marine ecosystems in the northeast Pacific and globally.

Three major challenges are:

1. detecting and documenting ecological changes,
2. attributing those changes to stressors; i.e. distinguish between climate change and other sources of change or variability, and
3. adjusting human activities to adapt to projected changes to marine ecosystems and ecosystem services. For example, reducing non-climate related human impacts will likely increase the resistance and resilience of the overall system to climate change impacts. Furthermore, goals and strategies to protect and maximize biological diversity will provide "natural insurance" against climate change in terms of ecosystem function and provision of ecosystem services.

Expected physical changes for the West Coast of Canada include changes in temperature, pH, precipitation, stratification, sea level, storms, North Pacific current, upwelling, snow-pack, spring freshet, salinity, and dissolved oxygen.

Biological changes will include, species distribution shifts, phenology (timing of species life history stages), increased extinction risk, physiological stress, invasive species, increased disease and toxins, nutrient enrichment and algal blooms.

As the climate changes, responses such as poleward expansions of species distribution and phenological changes will vary among species potentially causing mismatches of predators and prey or other interactors, thus leading to large functional changes in ecosystems.

Dynamic ecosystem models that provide integrated whole system analyses have been developed and can inform us about how climate change might impact whole ecosystems and how management strategies might alleviate such changes. Some models are already being used to make predictions about climate change. Ecosystem models have capabilities for anticipating integrated impacts, and can provide the information needed to adjust human uses and find solutions to changes occurring, in order to insure ecological integrity.

The definition of ecosystem based management (EBM) is partially dependent on perspective; for example someone from fisheries looking for an ecosystem-based approach to that fishery will be looking to optimize the viability of that fishery by considering broad ecosystem changes that effect the exploitation of that particular stock. Conversely, a person interested in protecting biodiversity and the broad services it supports will focus more on assessing the ancillary effects of that fishery on other components of the ecosystem.

Most current assessment approaches are single species-based, which limit the ability to respond knowledgeably to the whole ecosystem being affected. The proportional catch rate strategy is one example of a single species approach. If the stock decreases so do catch rates. Catch can also be reduced to zero if the stock drops below a certain level, thereby affording full protection to severely reduced stocks. However, this approach does not consider effects on the ecosystem as a whole.

Dynamic spatial strategies are used for stocks whose distributions change in response to oceanographic variability or other environmental conditions. First, species are tracked to determine distribution and habitat preferences. Throughout a season, updates in real time provide guidelines to fishermen as to where and how much stock they can access. This approach is responsive to environmental variability, but takes some investment in management infrastructure.

Simple spatial strategies are an ecosystem based approach that require relatively little information. Their main functions are: to protect the functioning of whole ecosystems, enhance system resistance and resilience, hedge in the face of limited information and control human activities such as fishery effort. A connected network of marine protected areas (MPAs) could protect the functional integrity of an ecosystem, even thought the system may be unavoidably non-stationary in a climate change context.

Some concepts for an overall framework to adaptation to climate change are worth examining; these include vulnerability to climate change, ecological resilience, cumulative or combined impacts, direct and indirect effects, ecological non-stationary systems, multiple scales of variability and change, integration of assessment and management, and use of adaptive and ecosystem based management.

One example of a broad framework is an Integrated Ecosystem Assessment, which looks at ecosystem changes from climate impacts by monitoring ecosystem indicators and management effectiveness. Vulnerability analysis is used to understand what the potential impacts will be. Ultimately management strategies are developed in an adaptive sense so they can be applied and evaluated.

Climate change will cause an increased vulnerability to other stressors (both anthropogenic and natural). Vulnerability is measured by exposure, sensitivity and adaptability. Some species have a higher vulnerability than others.

The vulnerability of marine life to climate change can be ranked quantitatively as was done recently by Hobday and his colleagues in Australia. This information can be used to prioritize areas and develop adaptation strategies. We can also examine which non-climate stressors can be reduced in order to allow the ecosystem to adapt to climate stress. Finally, information from model prediction can be used to adjust human uses in the ecosystem.

The adaptive capacity of British Columbia's coastal communities could be assessed and ranked based on a quantitative ranking methodology recently developed by McClanahan and his colleagues. The method was used to assess the adaptive capacity of eastern Indian Ocean coastal communities to climate change for adaptive planning purposes. The goal was to find solutions suited to particular regions. For example, the Republic of Seychelles, off the coast of Africa, is predicted to have high environmental susceptibility but high adaptability while Kenya has high environmental susceptibility but low adaptability, and thus will need relief and reorganization before effective adaptive measures can be implemented.

Ecosystem goals and utilitarian goals should be considered together. A goal oriented, integrated strategic approach is required to minimize the impacts of climate change on British Columbia's marine ecosystems and the services they provide. Consideration needs to be given to resilience, cumulative impacts, and the non-stationary nature of systems affected by climate change, along with the social adaptive capacity of the affected human systems. Multiple-approaches to the assessment of these marine ecosystems, complimented with indicator-based monitoring programs would provide the kind of framework needed to most effectively address climate change impacts in British Columbia. Finally, when planning for climate change impacts on a local and regional scale, managers must focus on those human activities that are manageable at that scale while keeping in mind the need for reductions of greenhouse gas emissions at a global scale.

Conclusions:

- Three major challenges relating to marine climate change impacts in British Columbia are (1) detection, (2) attribution, and (3) adjusting human activities as part of adaptation strategies.
- A variety of physical and biological changes are expected and integrated assessment approaches will be necessary to understand the ecological, social, and economic implications of these changes.

- There is a shift toward ecosystem-based approaches to management, which consider the broader implications of human activities and may lead to the utilization of a higher proportion of available ecosystem services.
- Vulnerability of ecosystems and social adaptive capacity of affected communities can be ranked quantitatively to prioritize response investment and to choose appropriate and effective management strategies. Integrated management is needed to implement such effective management strategies, but it can only be developed through the identification and pursuit of goals that transcend sectoral interests.

From Science to Solutions

The small group discussions focused on solutions to the issues raised during the presentations and on either adaptation or mitigation. Some thought provoking discussions explored the difference between adaptation and mitigation and which might be the better approach.

The general consensus was that adaptation and mitigation are not mutually exclusive. Mitigative measures are being implemented. This must continue. Simultaneously, adaptive measures are beginning to move forward. It was agreed that both strategies need to be considered.

Adaptation means dealing with a situation where impacts are already occurring and need to be addressed. Many impacts such as ocean acidification will take years of mitigative efforts to reverse. While that is happening, adaptive measures need to be developed and implemented. In the climate change debate, adaptation is often portrayed as giving up. Others, however, view the function of adaptation as a requirement to avoid hitting the wall. It is dynamic not static, and represents surviving, not giving up. Humankind is adaptive by nature.

Small Group Discussions and Report Back on Adaptation Solutions

All groups reporting back expressed a primary goal of maintaining a healthy ecosystem and ecological integrity, in part so that ecosystem services continue to support our coastal economy and well being. Numerous goals were considered including:

- reduce non-climate stressors
- plan for the changes that we are able to anticipate
- maintain trophic structure
- use a precautionary approach in managing ecosystems and in applying new technology.

Tactics for achieving those goals were identified and there were many ideas generated, however there was not sufficient time to reach consensus. Some of the tactics suggested included:

- harvest within ecologically sustainable limits
- regulate and enforce pollution standards
- establish a network of MPAs (20 to 30 percent)

- increase science and research capacity
- application of an Ecosystem Based Management approach

It was noted that consultation with and support from First Nations is essential. There must also be sufficient funding to implement the tactics since enforcement, research and monitoring have equally high costs. This was particularly emphasized in the discussion on MPAs.

There is a need for public engagement and leadership, to connect people to the ocean, and a need to find positive messaging for the challenges we face. Economic incentives should be provided for innovative solutions. Regulatory and policy changes need to be geared toward collaborative science, and developing an effective framework for researching climate change effects. In management, adaptability is necessary. In resource utilization we need a protocol of surveys, indicators, monitoring and action.

Small Group Discussions and Report Back on Mitigation Solutions

Reducing emissions is the strongest mitigation measure required. A reduction in our dependence on fossil fuels and a drastic reduction in $C0_2$ emissions are essential. Methane is another green house gas that is of great concern; it is considered to be part of the climate change problem and needs to be reduced.

Some numbers that were suggested in the discussions groups included:

- reductions of $C0_2$ to 350 ppm (parts per million) to avoid rising more than 2 °C. We are currently at 383 ppm
- from an ocean acidification perspective, anything more than 550 ppm would be a disaster
- some people are saying that 450 ppm may be what is attainable

Discussion around sources of CO_2 looked at:

- Electricity generation as 40 percent (mostly coal)
- Transportation (35 percent) – oil based hydrocarbons
- Land use changes forestry (25 percent) – wood and soil

Levels of change required

The different levels of government all have key roles and responsibility in making the changes necessary. Local, regional, provincial, First Nations, national and international could all apply certain mechanisms of change: market tax, or cap and trade incentives, or subsidies for solutions (along with efficiency and renewable energy) could be goals for any government. In the absence of global agreements there is the option of governments acting as if there were a global agreement and taking responsibility to set local targets at that level.

Industry has the opportunity to provide leadership by investing in technologies that move us away from fossil fuel consumption. Industry could also implement policy within their companies that supports positive, low impact growth and act as role models for others in doing the same.

Individuals and communities can focus on education, community gardens, reducing consumption, low impact transportation and renewable energy.

Outcomes

1. The conservation community was presented with invaluable scientific information about the effects of climate change on the ocean.
2. A connection between the conservation community and the science community focusing on the ocean and climate change was established. The connection will be valuable when it comes to developing policy specific to protecting our oceans from climate change.
3. A sense of direction for ocean conservation and management in the face of climate change was established among those attending.
4. Valuable ideas were discussed and a number of follow up actions were agreed upon, including a further strategy session to finalize policy requests and discuss campaign directions.

Next Steps

1. Living Oceans Society will circulate proceedings from this event and will organize a follow up forum to develop strategy and agreed upon specifics for further policy development.

2. The majority of participants felt a need for increasing understanding of scientific knowledge within NGOs and the public regarding the impacts of climate change on oceans.

3. Scientists agreed that keeping in touch would be a great approach. More frequent sharing of knowledge is required.

4. It would be ideal if ocean acidification could be a key issue at Copenhagen.

GLOSSARY

PROCEEDINGS

OCEANS AND CLIMATE CHANGE THINK TANK – DAY 2

Listed as appears in proceedings (as opposed to alphabetically) Listed as appears in proceedings (as opposed to alphabetically)

Marine protected areas (MPAs) - government designated sanctuaries set aside for conserving healthy, diverse and productive ocean ecosystems. MPAs help restore populations of fish and marine species whose numbers have decreased because of overexploitation and other industrial activities. They allow rare and endangered species to recover, and protect sensitive habitats, and spawning and rearing grounds. (http://www.livingoceans.org/programs/mpa/) Nov. 23 2009.

Stressor – An external stimulus that places stress on an organism.

Phenology - The study of periodic plant and animal life cycle events and how these are influenced by seasonal and interannual variations in climate (e.g. the date of emergence of leaves and flowers). In the scientific literature on ecology, the term is used more generally to indicate the time frame for any seasonal biological phenomena, including the dates of last appearance (e.g., the seasonal phenology of a species may be from April through September). (http://en.wikipedia.org/wiki/Phenology) Nov. 23 2009.

Ecosystem based management – a management approach that integrates ecologic, economic, and social aspects. It accounts for the cumulative impacts of human activities with diverse social and economic objectives, and it manages these objectives within the limits of functioning healthy ecosystems.

Trophic structure – The relationship of an organism to other organisms in the context of a food web (http://www.csa.com/discoveryguides/vent/gloss.php) (Nov. 23 2009). The word trophic means "to feed." When ecologists talk about trophic structure, they are referring to feeding relationships that include: predator-prey, parasite-host and plant-herbivore. Studies of trophic structure help ecologists understand the potential for competition for food. (http://www.bioinquiry.vt.edu/bioinquiry/Cheetah/cheetahpaid/cheetahhtmls/ecosystroph.html Nov. 23 2009.

Precautionary approach – the essence of the precautionary approach is given in Principle 15 of the Rio Declaration, which states; *"where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for*

postponing cost-effective measures to prevent environmental degradation." (http://www.comarchitect.org/webhelp/10_sustainable_development_terminology.htm) Nov. 23 2009.

As Garcia (1995) pointed out, "the wording, largely similar to that of the principle, is subtly different in that: (1) it recognizes that there may be differences in local capabilities to apply the approach, and (2) it calls for cost-effectiveness in applying the approach, e.g., taking economic and social costs into account." (http://en.wikipedia.org/wiki/Precautionary_principle#.22Principle.22_vs._.22approach.22) Nov. 23 2009.