



1st BRAZILIAN WORKSHOP ON CLIMATE CHANGES IN COASTAL ZONES: CURRENT KNOWLEDGE AND RECOMMENDATIONS

UNIVERSIDADE FEDERAL DE RIO GRANDE (FURG)

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The impacts of Global Climate Change on the environment and society represent the biggest challenge for human civilization in the twenty-first century. Scientists around the world are working intensely to understand the climatic processes involved and the possible consequences of climate change at global, regional and local levels. Governments of different countries have initiated studies of vulnerability to climate change and adopted mitigation and adaptation measures to face this new reality.

The establishment of the Brazilian Research Network on Global Climate Change (*Rede CLIMA*) and the implementation of the National Institute of Science and Technology (INCT) for Climate Change, were important initiatives to adequately address these issues in Brazil; since these organizations involve scientists of different disciplines. One of the main objectives of *Rede CLIMA* is to significantly increase the knowledge on the impact of climate change and to identify key vulnerabilities in different Brazilian sectors and systems. Coastal Zones stand out as an important system due to its environmental and societal significance.

Large cities and populations are concentrated near rivers and in low altitude regions (fertile valleys) within 100 km of the coastline, and population density of the coastal zone is likely to more than double by 2050. Impacts of climate change and urban development will triple the number of people exposed to coastal flooding by 2070. Goods and services from coastal ecosystems valued by society represent about 33 trillion dollars globally. Coastal zones are therefore, among the most vulnerable areas to global climate change impacts, since they will be directly affected by the increase in the average sea level, exposure to extreme storms, changes in discharge regimes of rivers, elevation of sea surface temperature, ocean acidification and other events. However, potential impacts of climate change, both physical and biological, will vary considerably among coastal regions, according to their natural characteristics and the degree of environmental degradation. Therefore, understanding the impacts of global climate change in every region is essential for strategic planning and decision-making by the government and the Brazilian society.

During the "First Brazilian Workshop on Climate Changes in Coastal Zones" in Rio Grande (RS), scientists from around the country assessed the current state of knowledge on impacts of climate change on Brazilian coastal zones and discussed procedures to standardize protocols and strategies for networking observational studies. About 200 university professors, graduate and post-graduate students attended the event. Among these, thirty-five were invited speakers from *Rede CLIMA* and the National Institute of Science and Technology (INCT) for Climate Change. Thirty-eight research papers (among oral and panels) were presented, representing 121 authors from different Brazilian institutions and regions. Based on the current state of knowledge and the discussions held during the workshop, the participants believe

that it is still possible to save the coastal ecosystem and its environmental assets (ecological, social and economic) against scenarios of climate change, although urgency and determination are required to achieve this task.

In order to adequately assess and monitor the effects of climate change on coastal ecosystems in Brazil, in an objective and regional manner, the following scientific goals have to be achieved urgently:

- 1) Validation of regional climate models based on local observational data;
- 2) Geodetically controlled measurements of sea level accompanied by altimetric surveys, integrating terrestrial and nautical cartography of important coastal regions of Brazil with scenarios for the twenty-first century;
- 3) Acquisition of long and sustainable time series of physical, chemical and biological processes in coastal waters;
- 4) Greater understanding of factors controlling the processes of erosion and coastal progradation;
- 5) Evaluation of the potential consequences of climate changes on aquatic biogeochemical cycles;
- 6) Analysis of the responses of physiological and ecological populations, marine, estuarine and freshwater communities and ecosystems on climate change;
- 7) Assessment of variability in fish stocks and other natural resources of economic importance;
- 8) Evaluation of social and economic vulnerability of coastal populations, particularly those that directly depend on coastal resources and traditional activities.

The advances in scientific knowledge on coastal ecosystems, with emphasis on the topics outlined above, will lead to better insights of the effects of climate change on coastal regions. Investments in environmental sciences in coastal areas, with emphasis on climate change are essential, therefore, for greater understanding of these important ecosystems and their vulnerabilities.

In this context, we recommend to the government and organized society that actions be created or strengthened to promote:

- The immediate reduction of emissions of greenhouse gases (GHGs) in order to contribute to slowing down global warming;
- The immediate deterrence of deforestation in different regions of the country;
- Advances in scientific knowledge on coastal ecosystems, with particular emphasis on topics already presented above, through the induction and effective support for research in these subject areas;
- The strengthening of the monitoring system of the Brazilian Coastal Zone;
- The development and implementation of management plans that promote the use, conservation and restoration of coastal ecosystems, considering climate change scenarios, thus strengthening existing and incidental public policies on this zone (National Coastal Management Program, “Orla” Project, Sector Plan for Sea Resources, National Plan for Water Resources, The Conservation National System, Local Agenda 21);
- The promotion and encouragement innovative solutions and actions that encourage adaptation measures in coastal cities and towns facing the new climate scenario;
- The expansion of the critical insight and awareness of society regarding the Climate Change, through formal education (via educational institutions) and non-formal (via the media, nongovernmental organizations, civil organizations etc.), with dissemination of clear and contextualized information about scientific aspects of the topic in the appropriate language.

For the implementation of these recommendations to be successful, depend on decision from local, State and Federal public policies engaged to Climate Change. Agility and long-term commitment are essential requirements to support and encourage the efforts of science and technology to confront and adapt to the challenges posed by climate change.

Rio Grande, October 20th 2009.

Declaration approved by 124 scientists linked to 20 federal and state institutions (distributed in eight states of the Brazilian coast) and three foreign institutions, belonging to leading groups in research on issues related to the sciences of the sea.

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