2011 EcoHCC

Tomar-Portugal

International Conference on Ecohydrology and Climate Change

Tomar-Portugal

15-17.09.2011

BOOK OF ABSTRACTS

www.ecohcc2011.ipt.pt

ipt Instituto Politécnico de Tomar

Universidade de Évora

Book of Abstracts

International Conference on Ecohydrology and Climate Change

Tomar, Portugal, 15th - 17th September, 2011

Organization:
Polytechnic Institute of Tomar, Mathematical Department of Business School
Évora University, Institute of Mediterranean Agrarian and Environmental Sciences (ICAAM)

Edited by
C. Andrade
Polytechnic Institute of Tomar, Mathematical Department of Business School, Tomar, Portugal
Email: c.andrade@ipt.pt

Published by
Polytechnic Institute of Tomar, Mathematical Department of Business School, Tomar, Portugal
ISBN: 978-972-9473-55-5
Title: EcoHCC'11 - Abstracts Book
Editor: Instituto Politécnico de Tomar
Address: Quinta do Contador, Estrada da Serra, 2300-313 Tomar, Portugal
Telephone: + 351 249 328 100

Contents

Soil degradation and Soil quality: Soil functions and Land Use

Johan Bouma[1]

[1] Em.Professor of Soil Science, Wageningen University, The Netherlands

Processes resulting in soil degradation are by now generally well known after decades of research and so are management measures needed to avoid or combat degradation effects. However, lack of an effective communication tool, such as a clear and transparent measure for soil quality, has hampered the creation of a feeling of urgency in society when dealing with soil degradation and its effects. The seven soil functions, proposed by the EU in its Soil Protection Strategy of 2006, may be helpful to define quality measures as will be illustrated for function 1, expressing water-limited biomass production as a ratio of potential production. Communication is also likely to benefit from linking soil functions to the concept of ecosystem services which gains prominence in policy circles. Thus, soil expertise can be more effectively linked to the policy arena. Soil functions should not only be defined for actual but also for potential conditions which are most relevant when considering ecohydrology as a function of climate change. Then, scenario analysis by modelling, considering the effects of alternative forms of land use, is needed. Here soil science faces the risk that others use soil databases and pedotransferfunctions for their models bypassing soil expertise. Soil scientists should therefore close the knowledge chain proving the relevance of soil research.Even though the advantages of introducing certain forms of land use to avoid or combat soil degradation can often be well demonstrated, nothing may happen in practice because of economic, social or political constraints. A plea will therefore be made for active engagement of at least some soil scientists in implementation practices to ensure that real-life examples of effective soil management in terms of avoiding soil degradation can be demonstrated.

Correspondence
Email: johan.bouma@planet.nl

Global Change and Geopolitics of Natural Resources

Nelson Lourenço[1], Carlos R. Machado[2]

[1] Rector of Universidade Atlântica;
Chair of the Portuguese National Committee for IGBP / Global Change;
Chair of the European Alliance of Global Change Research Committees.
Contacts: Instituto de Investigação Científica e Tecnológica da Universidade Atlântica.
Antiga Fábrica da Pólvora de Barcarena, 2730-036 Barcarena, Portugal.
Telephone: +351 214398226.
[2] Researcher of the Instituto de Investigação Científica e Tecnológica da Universidade Atlântica.
Antiga Fábrica da Pólvora de Barcarena. 2730-036 Barcarena, Portugal.
Telephone: +351 214398227.

In the last five millennia, the global climate system has been relatively stable. But, when climate changes significantly, or the environmental conditions degrade to the point in which necessary resources are not available, the tensions experienced by societies may lead them to a breaking point. Europe and the rest of the World are in a period of transition: a global financial crisis, a global energy crisis, a global food crisis, new centres of power and leadership emerging outside of Europe. In this context, Global Change is a process that is producing increasing pressures on society, making sustainability the biggest challenge for the society of the twenty-first century.

Sustainability is an open and multidimensional concept, which stimulates many different individual and collective, public or private, actors to seek a sustainable balance between production, consumption and preservation and regeneration of human and natural resources. The pursuit of sustainability, as a process of social change, requires different actors to cooperate, it generates different types of conflicts, and forces significant changes in terms of cultural values, in the production and consumption models, and in the governance systems (Lourenço and Machado, 2005).

Therefore, Global Change has an important geopolitical dimension, which results mainly from the fact that the consequences of environmental change are neither equal nor equitable between regions or countries (Barnett, 2007), and it is becoming increasingly evident that Global Change has a potential to disrupt the capacity of political, social and economic systems to adapt to change.

When analysing national security issues, stability is a main objective. Maintaining the stability within and between nations is often a means of avoiding large-scale military conflicts. Today, the capacity of the Earth (ecosystems and social, economic and cultural systems) to support human activities is being largely exceeded, creating an unstable situation that, in some regions, may be critical.

In the framework of conflict analysis, Global Change should be considered in terms of the nature and extent of the environmental stress it produces. This environmental stress is the result of two main factors: the scarcity of renewable natural resources; and the degradation of the quality of renewable natural resources resulting from increased human interaction with ecosystems. This interaction makes it increasingly more difficult to distinguish between natural and anthropogenic environmental changes. Unsurprisingly,

these two factors are strongly interconnected: environmental degradation may worsen the scarcity and tensions over the distribution and access to resources, while the scarcity of a natural resource can degrade its quality by overexploitation (Lietzmann and Vest, 1999).

The analysis of the relationship between environmental stress and conflict must take into account that environmental stress interacts with political, social and economic factors, and that this evolves through several stages before conflict arises. The main consequences of environmental stress (poverty, food insecurity, the spread of disease conditions, migration or refugee movements and disruption of social and political institutions) can, in a given adverse socio-economic and political context, contribute to conflicts, which in a reflexive manner can also lead to greater environmental stress.

Similar levels of environmental stress may have different consequences on the level of conflict intensity. Thus, to evaluate the potential for conflict associated with environmental stress, it becomes necessary to analyze the socio-economic and political context. In countries with strong governments and which are socially cohesive, even tense disputes can be solved peacefully. However, in countries with fragile governments or with weak support basis, the lack of resources is often a significant factor for internal or external conflict and instability.

Although, the competition for resources does not immediately trigger violent conflict, and no recent wars have been waged solely because of natural resources, there are a number of evidences that degradation of drinking water, loss of arable land, decline in food production and increase in the frequency of environmental disasters can lead to massive economic losses and large migrations, thus generating tension and conflict.

In fact, conflicts resulting from migration are triggered by voluntary or forced displacement and can be based on internal or cross-border migrations. The voluntary migration can be induced by structural changes such as persistent droughts, floods and soil erosion (desertification). Forced displacement is often associated with large industrial projects, mining, construction of dams and forestation plans.

In the absence of empirical evidence concerning the more alarmist scenarios of Homer-Dixon (2001) and Michael Klare (2002) who foreseen an increasing likelihood of violent conflict or war among states because of natural resources, it is certain that nowadays, the depletion and degradation of natural resources is a fundamental issue in the framework of global security. Therefore, the way in which scarce resources can instigate conflict or foster peaceful cooperation it is still an open question that needs to be considered as part of the new Governance for Sustainability.

References:

Barnett, J. (2007): The Geopolitics of Climate Change. Geography Compass 1, 6, pp. 1361-1375.
Giddens, A. (2009): Politics of Climate Change. Cambridge: Polity Press.
Homer-Dixon, T. F. (2001): Environment, Scarcity, and Violence. Princeton and Oxford: Princeton University Press
Klare, M. T. (2002): Resource Wars: The New Landscape of Global Conflict. New York: Holt Paperbacks.
Lietzmann, K. M., and Vest, G. D. (1999): Environment & Security in an International Context. Bruxelles: NATO Committee on the Challenges of Modern Society
Lourenço, N., and Machado, C. R. (2005): Water Resources and Sustainable Development: Factors and Constraints for Improving Human Well-being in Water-stressed Regions. Proceedings of the MAN-PORIVERS International Workshop on Management Policies and Control Measures for Priority Pollutants in River Basin.

Keywords:
Global Change, Natural Resources, Geopolitics, Conflicts, Sustainability, Security

Correspondence
Email: nelsonl@uatlantica.pt, cmachado@uatlantica.pt

Resistance, resilience and community dynamics in fluvial ecosystems disturbed by contrasting hydrologic conditions: The case of mediterranean-climate streams

Avital Gasith[1], Y. Hershkovitz[1]

[1] Department of Zoology, Faculty of Life Sciences, Tel-Aviv University, Tel-Aviv 69978, Israel

Ecological disturbances are defined by their physical effect and/or by their impact on the biota. Such disturbances may modify habitat structure, conditions and resources to the disadvantage of pre-disturbance resident biota, killing organisms or threatening their well-being and, in so doing, modifying community organization. Most natural disturbances are non-catastrophic (i.e. some resident biota survive) and act as strong evolutionarily-selective forces.

We review how stream communities respond to natural contrasting hydrologic disturbances typical of mediterranean-climate streams (mcs; Mediterranean denotes Mediterranean basin only). Globally, there are five mediterranean-climate regions (med-regions; Mediterranean Basin and parts of coastal California, Chile, South Africa and Australia). They are characterized by a seasonal precipitation pattern of a water surplus in winter and strong water deficit in summer. Rainfall amounts vary among these regions, being lowest in the semi-arid ones (annual average < 500 mm). Rainfall also varies among years, ranging from extremely wet to extremely dry years, which alternate inter-annually in unpredictable succession. This precipitation pattern produces the mcs seasonal, sequential, contrasting hydrologic disturbances in the form of flooding and desiccation.

Floods are discrete pulse events, abruptly affecting habitat condition and community structure; whereas droughts are often ramp-shaped events that gradually intensify as desiccation and water drawdown progresses. However, once flow connectivity is disrupted, the drying impact on communities isolated in pools may be abrupt.

Most fluvial ecosystems experience natural hydrologic changes of high or low flows emanating from flooding and desiccation. In mcs, differences in precipitation combined with varying successions of wet and dry years result in temporal and spatial variability of water permanence, ranging from perennial, through intermittent, to quasi-ephemeral flow. Manifestation of these contrasting flow disturbances is greatest in the more arid med-regions due to high desiccation pressure and low water permanence.

During evolution, the biota of disturbed ecosystems (such as mcs) acquires adaptive traits that attune their populations to their environment. Some organisms in affected sites may die off and their populations be decimated; while others may endure a disturbance or avoid it. Organisms avoiding disturbance may be displaced from a disturbed site (e.g. washed downstream by floods and survive), or use behavioral and life-history adaptations for a timely move to more protected sites, within or outside their resident ecosystem (internal or external refuges). Endurance and avoidance responses are generally recognizable as different forms of resistance to environmental stresses.