

Sustainable water and land management in semi-arid regions: Middle East and North Africa (MENA)

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Land degradation, over-irrigation and desertification in the Middle East and North Africa (MENA) and other semi-arid areas of the Earth are adding further stresses to regions already under pressure from global environmental change. This workshop, co-sponsored by the International Geosphere-Biosphere Programme (IGBP) and the Egyptian Academy of Scientific Research and Technology (ASRT), provided a forum for local and international researchers to highlight land- and water-related problems in semi-arid regions, and to propose adaptation and mitigation strategies. The workshop aimed to refine IGBP's scientific agenda for applied Earth System science and sustainability in the MENA region, and to identify where IGBP and MENA researchers can better contribute to addressing mitigation, innovation and adaptation, large-scale pilot projects and institutional networking.

Sessions focused on the main pressures in the area; drought, water use and management, land degradation and desertification, and impacts on humans and ecosystems. Presentations were given by MENA scientists, as well as international

experts and leaders of several IGBP projects on land, atmosphere, historical perspectives and modeling.

Countries in the MENA region are confronted with large changes in land use and related stresses on their water supplies. Global environmental changes will strongly affect the region, causing an expected rise in average temperature of 1-4°C by 2060, and a decline in annual precipitation by, for example, 10-40% over much of Egypt by 2100. Impacts of global change in the area include water scarcity, food shortage, loss of biodiversity, sea level rise and pressures on human health.

In view of such developments, the impact on water resources and ecosystems in the MENA countries require integrated water management strategies emphasizing maximization of water use efficiency and maximum financial return of unit water volume. However, such strategies cannot ignore the social dimensions of water, and its role as an important element in maintaining food security (especially for the poor), social cohesion, and political stability. The transboundary aspect of key water resources in the MENA region, ex-

tending beyond national borders, will also require policies that are trans-regional. The impact of climate change must, therefore, also be discussed in the broader context of social and political stressors, such as inappropriate water management policies or economics. Chronic poverty conditions, unemployment, rapid population increase, accelerating urbanization, land reclamation and industrial development cannot be excluded from the debate on resilience, sustainability and coping strategies.

The workshop included a session on the African Network of Earth System Science (AfricanNESS), an initiative launched at IGBP's Congress in South Africa in May 2008. The goal of AfricanNESS is to develop a network for global environmental change in Africa, with thematic clusters—rainfall, land cover, livelihoods, cities, diseases and pests, Africa and the Earth system, integrated development, and marine.

Participants re-affirmed the importance of the participation of MENA in IGBP research in order to better understand pressing environmental changes and concomitant social responses, to assess vulnerability, and to contribute to the effective mitigation and coping strategies that will have to include, by necessity, social and economical components to achieve the goals of sustainable development. The participants stressed the importance of further research to remedy the current lack of available information from the MENA region and other African countries, to critically assess existing data sets, to integrate climate modeling with climatic and environmental proxies, and to elucidate the social mechanisms in responding and coping with environmental change.

The workshop ended with a session on "Drought and Humans: Learning from the Past". It covered existing evidence of climatic variability and the impact of droughts and other climatic events on water and life-support resources, and social systems during the last 10 ka. Key outcomes of the PAGES ESF-MedCLIVAR Symposium "Climate extremes during recent millennia and their impact on Mediterranean societies" (Athens, 2008) were also presented. In



Figure 1: Historical records from the MENA region. Left: *Anales Palatinos*. Right: View of the Nilometer (Luigi Mayer, R. Brown Historic Gallery, Pall Mall 1802).

particular, the need for long-term, high-quality and high-resolution data from both instrumental records and historic archives, and the benefits of a multiproxy approach, were stressed. Further, it was recognized that in order to bridge the communication gap between various research communities, future research should focus on developing stronger integration and exchange between paleodata researchers and modelers. The importance of continuous caution and re-evaluation of possible human impact on the proxy recording process and resultant signal was also emphasized.

The current changes in the Earth System, which are strongly associated with

the coupled human-environment system, make the integration of cultural and Earth processes and dynamics a priority for developing future coping strategies.

The MENA region is one of the most vulnerable spots on the globe (World Bank, 2007). It is also of paramount geopolitical significance. This places the MENA region as a priority for international and trans-regional collaborative research by scientists from complimentary disciplines, with the main objective of sustaining development, food security and political stability. Information gained from the MENA region will, in addition, contribute to a better understanding of the global changes in the Earth

System. The exceptional historical records from the region (Fig. 1) are also bound to provide well-documented case studies of how social systems responded and coped with environmental change.

Note

Sections of this article were extracted from the IGBP Secretariat Press Release see www.igbp.net/page.php?pid=444

References

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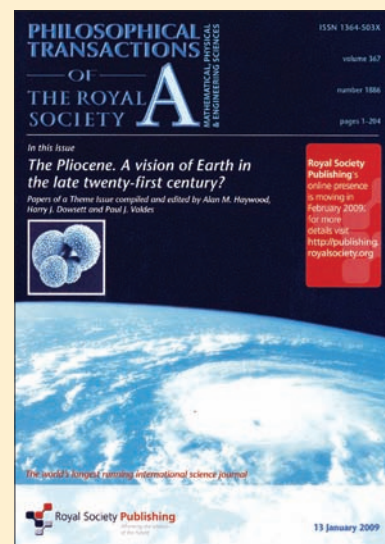
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