

The Importance of Land and Water Engineering and Management for Food Security

Pereira L¹

¹LEAF- Landscape, Environment, Agriculture and Food, Institute of Agronomy, University of Lisbon, Tapada da Ajuda, Portugal. E-mail: lspereira@isa.ulisboa.pt

Abstract

The continued population growth associated with an increased demand for food constitute a great challenge for land and water engineers, managers and policy makers since food security is a main issue in the XXI century. In fact, land availability is likely decreasing and soils are degrading, which call for new, innovative measures of land protection and soil conservation and preservation. In association, water scarcity is increasing at same time that there is an increased demand for water, particularly for irrigated agriculture. However, land and water productivity under irrigation are increasing and there is potential for its sustainable growth. Issues required for sustainability of food production need to be well known and related policies must be considered. Issues include those referring to the sustainability of family farming vs. capital intensive farming, questions relative to the sustainability of surface irrigation vs. pressurized, energy demanding methods, and to the adequate mix of knowledge and practice when looking for land and water productivity. A few examples are given.

Keywords: economic return, land productivity, land protection, sustainable land and water use, water conservation and saving, water productivity, water scarcity

Bibliography

- Alexandratos N, Bruinsma J. 2012. World agriculture towards 2030/2050: the 2012 revision. Roma: FAO. ESA Work paper, 12-03
- Bruinsma J. 2009. The resource outlook to 2050:1 by how much do land, water and crop yields need to increase by 2050? In: Expert Meeting on How to feed the World in 2050. FAO and UNESD, Rome.
- Calzadilla, Rehdanz K, Tol RSJ. 2010. The economic impact of more sustainable water use in agriculture: A computable general equilibrium analysis. *Journal of Hydrology* 384, 292-305.
- Carruthers I, Rosegrant MW, Seckler D. 1997. Irrigation and food security in the 21st century. *Irrig. Drain. Syst* 11: 83-101.
- Darouich H, Pedras CMG, Gonçalves JM, Pereira LS. 2014. Drip vs. surface irrigation: a comparison focusing on water saving and economic returns using multicriteria analysis applied to cotton. *Biosyst. Eng.* 122, 74-90.
- de Fraiture C, Wichelns D. 2010. Satisfying future water demands for agriculture. *Agricultural Water Management* 97, 502-511.
- Fischer RA, Byerlee D, Edmeades GO. 2009. Can technology deliver on the yield challenge to 2050? In: Expert Meeting on How to feed the World in 2050. FAO and UNESD, Rome.
- Giorgi F. 2006. Climate change hot-spots, *Geophys. Res. Lett.* 33, L08707, doi:10.1029/2006GL025734.
- Godfray HCJ, Beddington JR, Crute IR, Haddad L, Lawrence D, Muir JF, Pretty J, Robinson S, Thomas SM, Toulmin C. 2010. Food Security: The Challenge of Feeding 9 Billion People. *Science* 327, 812-818.
- Kang S. Improving Water Productivity for China's Food Security under Changing Environments. Center for Agricultural Water Research in China, China Agricultural University, Beijing.
- Molden D, Oweis T, Steduto P, Bindraban P, Hanjra MA, Kijne J. 2010. Improving agricultural water productivity: Between optimism and caution. *Agricultural Water Management* 97, 528-535.
- Paredes P, Rodrigues GC, Alves I, Pereira LS. 2014. Partitioning evapotranspiration, yield prediction and economic returns of maize under various irrigation management strategies. *Agric Water Manage* 135, 27-39.
- Pereira LS, Oweis T, Zairi A. 2002. Irrigation management under water scarcity. *Agric Water Manage* 57, 175-206.
- Pereira LS, Cordery I, Iacovides I. 2009. Coping with Water Scarcity. Addressing the Challenges. Springer, Dordrecht, 382 p.
- Pereira LS, Cordery I, Iacovides I. 2012. Improved indicators of water use performance and productivity for sustainable water conservation and saving. *Agric Water Manage* 108, 39-51.
- Ragnarsdóttir KV, Banwart SA (eds.). 2015. Soil: The Life Supporting Skin of Earth. University of Sheffield, Sheffield and the University of Iceland, Reykjavik (Iceland).
- Saadi S, Todorovic M, Tanasijevic L, Pereira LS, Pizzigalli C, Lionello P. 2014. Climate change and Mediterranean agriculture: Impacts on winter wheat and tomato crop evapotranspiration, irrigation requirements and yield. *Agric Water Manage* 147, 103-115.
- Tanasijevic L, Todorovic M, Pizzigalli C, Lionello P, Pereira LS. 2014. Impacts of climate change on olive crop evapotranspiration and irrigation requirements in the Mediterranean region. *Agric. Water Manage.* 144, 54-68, United Nations, Department of Economic and Social Affairs, Population Division, 2014. World Urbanization Prospects: The 2014 Revision, Highlights (ST/ESA/SER.A/352).
- Wada Y, van Beek LP H, Bierkens MF P. 2012. Nonsustainable groundwater sustaining irrigation: A global assessment. *Water Resources Research* 48, W00L06, doi:10.1029/2011WR010562,
- WWAP (United Nations World Water Assessment Programme) 2015. The United Nations World Water Development Report 2015: Water for a Sustainable World. Paris, UNESCO.