

References

1. Motivation for new research on water, land, and ecosystems

- 2030 Water Resources Group. 2009. *Charting our water future. Economic frameworks to inform decision-making*. Water Resources Group. Available at [www.2030waterresourcesgroup.com/water_full/Charting Our Water Future Final.pdf](http://www.2030waterresourcesgroup.com/water_full/Charting_Our_Water_Future_Final.pdf) (accessed on August 17, 2011).
- Bai, Z. G.; Dent, D. L.; Olsson, L.; Schaepman, M. E. 2008. *Global assessment of land degradation and improvement. 1. Identification by remote sensing*. Report 2008/01. Rome: Food and Agriculture Organization of the United Nations (FAO); Wageningen: World Soil Information (ISRIC).
- Bai, Z. G.; Dent, D. L. 2006. *Global assessment of land degradation and improvement: Pilot study in Kenya*. Report 2006/01. Wageningen: World Soil Information (ISRIC).
- Bassett, T. J. 2010. Reducing hunger variability through sustainable development. *Proceedings of the National Academy of Sciences* 107(13): 5697–5698.
- Bates, B. C.; Kundzewicz, Z. W.; Wu, S.; Palutikof, J. P. (Eds.). 2008. *Climate change and water*. Technical Paper of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: IPCC Secretariat. 210p.
- Bekunda, M.; Sanginga, N.; Woomer, P.L. 2010. Restoring soil fertility in sub-Saharan Africa. In: *Advances in Agronomy*, Donald, L. S. (Ed.), pp. 183–236.
- Bloom, D. E. 2011. 7 billion and counting. *Science* 333(6042): 562–569.
- Bruinsma, J. 2009. *The resource outlook to 2050: By how much do land, water and crop yields need to increase by 2050?* Paper presented at the FAO Expert Meeting, June 24–26, 2009, Rome, on “How to Feed the World in 2050”. Rome: Food and Agriculture Organization of the United Nations, Economic and Social Development Department. Available at <ftp://ftp.fao.org/docrep/fao/012/ak971e/ak971e00.pdf> (accessed on August 17, 2011).
- Chartres, C.; Varma, S. 2010. *Out of water: from abundance to scarcity and how to solve the world's water problems*. Upper Saddle River, NJ, USA: FT Press. 230p.
- CA (Comprehensive Assessment of Water Management in Agriculture). 2007. *Water for food, water for life: A comprehensive assessment of water management in agriculture*. London: Earthscan; Colombo: International Water Management Institute.
- de Graaf, J. Kessler, A.; Nibbering, W. J. 2011. Agriculture and food security in selected countries in sub-Saharan Africa: diversity in trends and opportunities. *Food Security* 3(2): 195–213
- Fischer, J.; Brosi, B.; Daily, G. C.; Ehrlich, P.R.; Goldman, R.; Goldstein, J.; Lindenmayer, D. B.; Manning, A. D.; Mooney, H. A.; Pejchar, L.; Ranganathan, J.; Tallis, H. 2008. Should agricultural policies encourage land sparing or wildlife-friendly farming? *Frontiers in Ecology and the Environment* 6(7): 380–385.
- Green, V. S.; Cavigelli, M. A.; Dao, T. H.; Flanagan, D. C. 2005 Soil physical properties and aggregate-associated C, N, and P distributions in organic and conventional cropping systems. *Soil Science* 170(10): 822–831
- Harwood, R. R.; Kassam, A. H. (Eds.). 2003. *Research towards integrated natural resources management: Examples of research problems, approaches and partnerships in action in the CGIAR*. CGIAR Interim Science Council, Center Directors Committee on Integrated Natural

- Resources Management. Rome: Food and Agriculture Organization of the United Nations (FAO). 168 pp.
- Horton, R. 2010. The continuing invisibility of women and children. *The Lancet* 375(9730): 1941–1943.
- Lawrence, P.; Meigh, J.; Sullivan, C. 2002. *The water poverty index: an international comparison*. Keele Economics Research Papers KERP 2002/19. Keele, Staffordshire, UK: Keele University, Department of Economics. Available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.13.2349&rep=rep1&type=pdf>
- Lee, R. 2011. The Outlook for population growth. *Science* 333 (6042): 569–573
- MA (Millennium Ecosystem Assessment). 2005. *Living beyond our means: Natural assets and human well-being*. Statement from the Board. Paris, France: United Nations Environment Programme (UNEP). 28p. Available at http://pdf.wri.org/ma_board_final_statement.pdf (accessed on August 22, 2011).
- McCool, S. F.; Guthrie, K. 2001. Mapping the dimensions of successful public participation in messy natural resources management situations. *Society and Natural Resources* 14: 309–323.
- Nellemann, C.; MacDevette, M.; Manders, T.; Eickhout, B.; Svihus, B.; Prins, A. G.; Kaltenborn, B. P. (Eds.). 2009. *The environmental food crisis - the environment's role in averting future food crises*. A UNEP Rapid Response Assessment. United Nations Environment Programme, GRID-Arendal. Available at www.grida.no/files/publications/FoodCrisis_lores.pdf (accessed on August 17, 2011).
- Oldeman, L. R.; Hakkeling, R. T. A.; Sombroek, W. G. 1991. *World map of the status of human-induced soil degradation: an explanatory note*. Nairobi, Kenya: United Nations Environment Programme (UNEP); Wageningen, the Netherlands: International Soil Reference and Information Centre (ISRIC). Available at www.isric.nl/ISRIC/webdocs/docs/explannote.pdf (accessed on August 17, 2011).
- Pinstrup-Andersen, P. and Pandya-Lorch, R. 1998. Food security and sustainable use of natural resources: A 2020 vision. *Ecological Economics* 21: 1–10.
- Pretty, J.; Toulmin, C.; Williams, S. 2011 Sustainable intensification in African agriculture. *International Journal of Agricultural Sustainability* 9(1): 5–24.
- Pretty, J. N.; Noble, A. D.; Bossio, D.; Dixon, J.; Hine, R. E.; De Vries, F. W. T. P.; Morison, J. I. L. 2006. Resource-conserving agriculture increases yields in developing countries. *Environmental Science and Technology* 40(4): 1114–1119.
- Roberts, L. 2011. 9 billion? *Science* 333(6042): 540–543.
- Rockström, J.; Steffen, W.; Noone, K.; Persson, Å.; Chapin, III, F. S.; Lambin, E.; Lenton, T. M.; Scheffer, M.; Folke, C.; Schellnhuber, H.; Nykvist, B.; De Wit, C. A.; Hughes, T.; van der Leeuw, S.; Rodhe, H.; Sörlin, S.; Snyder, P. K.; Costanza, R.; Svedin, U.; Falkenmark, M.; Karlberg, L.; Corell, R. W.; Fabry, V. J.; Hansen, J.; Walker, B.; Liverman, D.; Richardson, K.; Crutzen, P.; Foley, J. 2009. Planetary boundaries: Exploring the safe operating space for humanity. *Ecology and Society* 14(2): 32.
- Sanchez, P. A. 2009. A smarter way to combat hunger. *Nature* 458: 148.
- Sanchez, P. A.; Swaminathan, M. S. 2005. Cutting world hunger in half. *Science* 307: 357–359.
- Scherr, S.; McNeely, J. (Eds). 2009. *Farming with nature: The science and practice of ecoagriculture*. Washington, D.C.: Island Press.
- Shah, T. 2009. *Taming the anarchy: groundwater governance in South Asia*. Washington, DC: Resources for the Future; Colombo: International Water Management Institute. 310p.

- Smakhtin, V. U.; Revenga, C.; Döll, P. 2004. *Taking into account environmental water requirements in global-scale water resources assessments*. Colombo, Sri Lanka: International Water Management Institute (IWMI), Comprehensive Assessment Secretariat. 29p. (Comprehensive Assessment of Water Management in Agriculture Research Report 2).
- van der Zaag, P. 2010. Viewpoint – water variability, soil nutrient heterogeneity and market volatility – why sub-saharan africa's green revolution will be location-specific and knowledge-intensive. *Water Alternatives* 3(1): 154–160.
- Vlek, P. L. G.; Le, Q. B.; Tamene, L. 2010. Assessment of land degradation, its possible causes and threat to food security in sub-Saharan Africa. In: *Advances in Soil Science – Food Security and Soil Quality*, Lal, R.; Stewart, B. A. (Eds), pp. 57–86. Boca Raton: CRC Press.
- WHO (World Health Organization). 2007. *The world health report 2007. A safer future. Global public health security in the 21st century*. Geneva, Switzerland: World Health Organization. Available at www.who.int/whr/2007/whr07_en.pdf (accessed August 17, 2011).
- Winslow, M. D.; Vogt, J. V.; Thomas, R. J.; Sommer, S.; Martius, C.; Akhtar-Schuster, M. 2011. *Land Degradation & Development* 22(2): 145–312.
- Woomer, P. L.; Munchena, F. N. 1996. Recognizing and overcoming soil constraints to crop production in tropical Africa. *African Crop Science Journal* 4(4): 503–518.
- You, D.; Jones, G.; Hill, K.; Wardlaw, T. 2010. Levels and trends in child mortality, 1990–2009. *The Lancet* 376(9745): 931–933.
- Zika, M.; Erb, K. 2009. The global loss of net primary production resulting from human-induced soil degradation in the drylands. *Ecological Economics* 69(2): 310–318.

3. From research to outcomes and impacts

- Douthwaite, B. 2002. *Enabling innovation: A practical guide to understanding and fostering technological change*. London, UK: Zed Books.
- Douthwaite, B.; Kuby, T.; van de Fliert, E.; Schulz, S. 2003. Impact pathway evaluation: An approach for achieving and attributing impact in complex systems. *Agricultural Systems* 78: 243–265.
- Weiss, C. H. 1995. Nothing as practical as good theory: Exploring theory-based evaluation for comprehensive community initiatives for children and families. In: *New approaches to evaluating community initiatives: Concepts, methods, and contexts*, Connell, J. P.; Kubisch, A. C.; Schorr, L. B.; Weiss, C. H. (Eds.). Washington, DC: Aspen Institute.

4. Strategic Research Portfolio – Irrigated Systems

- Barker, R.; Meinzen-Dick, R.; Shah, T.; Tuong, T. P.; Levine, G. 2010. *Managing irrigation in an environment of land and water scarcity*. IRRI Silver Jubilee Publication. Los Banos, the Phillippines: IRRI.
- CA (Comprehensive Assessment of Water Management in Agriculture). 2007. *Water for food, water for life: A comprehensive assessment of water management in agriculture*. London: Earthscan; Colombo: International Water Management Institute.
- Carruthers, I.; Stoner, R. 1981. *Economic aspects and policy issues in groundwater development*. World Bank Staff Working Paper 496. Washington, D.C.: World Bank.
- FAO (Food and Agricultural Organization of the United Nations). 2006. FAOSTAT database.

- FAO. 2007. *Irrigation management transfer: Worldwide efforts and results*. FAO Water Reports No. 32. Colombo, Sri Lanka: IWMI; Rome, Italy: FAO.
- FAO. 2008. *Andhra Pradesh farmer managed groundwaters Systems: Evaluation report*. FAO, Rome.
- Faures, J. M.; Svendsen, M.; Turrall, H.; Berkhoff, J.; Bhattarai, M.; Caliz, A. M.; Darghouth, S.; Doukkali, M. R.; El-Kady, M.; Facon, T.; Gopalakrishnan, M.; Groenfeldt, D.; Chu Thai Hoanh; Hussain, I.; Jamin, J. Y.; Konradsen, F.; Leon, A.; Meinzen-Dick, R.; Miller, K.; Mirza, M.; Ringler, C.; Schipper, L.; Senzanje, A.; Tadesse, G.; Tharme, R.; van Hofwegen, P.; Wahaj, R.; Varela-Ortega, C.; Yoder, R.; Zhanyi, G. 2007. Reinventing irrigation, pp.353–394. In *Water for food, water for life: A comprehensive assessment of water management in agriculture*, Molder, D. (Ed.). UK: Earthscan; Colombo, Sri Lanka: International Water Management Institute (IWMI).
- Garduño, H; Foster, S; Raj, P; van Steenberg, F. 2009. *Addressing Groundwater Depletion Through Community-based Management Actions in the Weathered Granitic Basement Aquifer of Drought-prone Andhra Pradesh – India*. Sustainable Groundwater Management: Concepts and Tools, Case Profile Collection Number 19. Washington, DC: World Bank.
- Giordano, M.; Villholth, K. (Eds). 2007. *The Agricultural Groundwater Revolution: Opportunities and Threats to Development*. CAB International.
- Hunt, R.C. 1989. Appropriate social organization? Water user associations in bureaucratic canal irrigation systems. *Human Organization* 48(1): 79–89.
- Inocencio, A.; Kikuchi, M.; Tonosaki, M.; Mayurama, A.; Merrey, D.; Sally, H.; De Jong, I. 2007. *Costs and performance of irrigation projects: A comparison of sub-Saharan Africa and other developing regions*. IWMI Research Report 109. Colombo, Sri Lanka: International Water Management Institute.
- Keller, A.; Keller, J. 1995. *Effective Efficiency: A Water Use Concept for Allocating Freshwater Resources*. Water Resources and Irrigation Division Discussion Paper 22. Arlington, Va.: Winrock International.
- Llamas R.; Custodio, E. (Eds). 2003. *Intensive use of groundwater: Challenges and opportunities*. Lisse, the Netherlands: Swets and Zeitlinger B.V. 478 p.
- Mukherji, A., 2004. Groundwater market in Ganga–Meghna–Brahmaputra basin: a review of theory and evidence. *Economic and Political Weekly* 30(31): 3514–3520.
- Mukherji, A.; Villholth, K. G.; Sharma, B. R.; Wang, J. (Eds). 2009a. *Groundwater governance in the Indo-Gangetic and Yellow River basins: Realities and Challenges*. CRC Press, Taylor and Francis Group.
- Mukherji, A.; Das, B.; Majumdar, N.; Nayak, N. C.; Sethi, R. R.; Sharma, B. R. 2009b. Metering of agricultural power supply in West Bengal, India: Who gains and who loses? *Energy Policy* 37 (12): 5530–5539.
- Ngigi, S.N. 2009. *Climate Change Adaptation Strategies: Water Resources Management Options for Smallholder Farming Systems in Sub-Saharan Africa*. New York: The MDG Centre for East and Southern Africa, The Earth Institute at Columbia University. 189p.
- Perry, C. J. 2001. *Charging for irrigation water: the issues and options, with a case study from Iran*. Research Report No. 52, Colombo, Sri Lanka: International Water Management Institute
- Rama Mohan, R. V. 2009. Social regulation of groundwater and its relevance to existing regulatory framework in Andhra Pradesh, India, pp. 231–246. In: *Groundwater governance in the Indo-Gangetic and Yellow River basins: Realities and Challenges*. Mukherji, A.; Villholth, K. G.; Sharma, B. R.; Wang, J. (Eds). CRC Press, Taylor and Francis Group.

- Sakthivadivel, R.; de Fraiture, C.; Molden, D. J.; Perry, C.; Kloezen, W. 1999. Indicators of land and water productivity in irrigated agriculture. *International Journal of Water Resources Development* 15(1/2): 161–179.
- Shah, T. 2009. *Taming the anarchy: Groundwater governance in South Asia*. Washington, D.C.: Resources for the Future Press.
- Shah, T.; Koppen, B.V.; Merrey, D.; Lange, M. D.; Samad, M. 2002. *Institutional alternatives in African smallholder irrigation: Lessons from international experience with irrigation management transfer*. Research Report No. 60. Colombo, Sri Lanka: International Water Management Institute.
- Shah, T. 1993. *Groundwater Markets and Irrigation Development: Political Economy and Practical Policy*. Bombay: Oxford University Press.
- Sharma, B. R.; Ambili, G. K. 2009. The Punjab Preservation of Subsoil Water Act: A regulatory mechanism for saving water.
- Suhardiman, D., 2008. *Bureaucratic Designs: The Paradox in Irrigation Management Transfer Policy in Indonesia*. PhD Thesis. Wageningen, The Netherlands: Wageningen University.
- Wang, J.; Huang, J.; Zhang, L.; Huang, Q.; Rozelle, S. 2010. Governance and water use efficiency: The five principles of WUA management and performance in China. *Journal of the American Water Resources Association* 46(4): 665–685.
- World Bank. 2010. *Deep wells and prudence: towards pragmatic action for addressing groundwater overexploitation in India*. Washington, D.C.: The World Bank.

5. Strategic Research Portfolio: Rainfed Systems

- Angassa, A.; Oba, G. 2008. Herder perceptions on impacts of range enclosures, crop farming, fire ban and bush encroachment on the rangelands of Borana, Southern Ethiopia. *Human Ecology* 36: 201–215.
- Ayarza, M. A.; Wélchez, L. A. 2004. Drivers effecting the development and sustainability of the Quesungual Slash and Mulch Agroforestry System (QSMAS) on hillsides of Honduras, pp. 187–201. In: *Comprehensive Assessment “Bright Spots” Project. Final Report*. Colombo, Sri Lanka: International Water Management Institute.
- Baker, L.; Hoffman, M. T. 2006. Managing variability: herding strategies in communal rangelands of semiarid Namaqualand, South Africa. *Human Ecology* 34: 765–784.
- Ben Mechlia, N.; Masmoudi, M.M. 2003. Deficit irrigation of orchards. Available at <http://ressources.ciheam.org/om/pdf/b44/03001805.pdf> (accessed 21 September, 2011).
- Birch, I.; Grahn, R. 2007. Pastoralism – Managing Multiple Stressors and the Threat of Climate Variability and Change. In: *Human Development Report 2007/2008*. New York: UNDP.
- Borras, S.M. Jr.; Hall, R.; Scoones, I.; White, B.; Wolford, W. 2011. Towards a better understanding of global land grabbing: an editorial introduction. *Journal of Peasant Studies* 38(2): 209–216.
- Butt, B.; Shortridge, A.; Winklerprins, A. 2009. Pastoral herd management, drought coping strategies, and cattle mobility in Southern Kenya. *Annals of the Association of American Geographers* 99(2): 309–334.
- CA (Comprehensive Assessment of Water Management in Agriculture). 2007. *Water for food, water for life: A comprehensive assessment of water management in agriculture*. London: Earthscan; Colombo: International Water Management Institute.

- Campbell, B.; Gordon, I. J.; Luckert, M. K.; Petheram, L.; Vetter, S. 2006. In search of optimal stocking regimes in semi-arid grazing lands: One size does not fit all. *Ecological Economics* 60: 74–85.
- Castro, A.; Rivera, M.; Ferreira, O.; Pavón, J.; García, E.; Amézquita, E.; Ayarza, M.; Barrios, E.; Rondón, M.; Pauli, N.; Baltodano, M. E.; Mendoza, B.; Wélchez, L. A.; Cook, S.; Rubiano, J.; Johnson N. and Rao, I. 2009. Quesungual slash and mulch agroforestry system improves crop water productivity in hillside agroecosystems of the sub-humid tropics, pp. 89–97. In: *Increasing the productivity and sustainability of rainfed cropping systems of poor smallholder farmers. Proceedings of the CGIAR challenge program on water and food international workshop on rainfed cropping systems*. Humphreys, E.; Bayot, R. S. (Eds). Battaramulla, Sri Lanka: CGIAR Challenge Program on Water & Food.
- Chaudhuri, S.; Banerjee, D. 2010. FDI in agricultural land, welfare and unemployment in a developing economy. *Research in Economics* 64(4): 229–239.
- CIAT. 2009. *Quesungual slash and mulch agroforestry system (QSMAS): Improving crop water productivity, food security and resource quality in the sub-humid tropics*. CPWF Project Report. Cali, Colombia: CPWF. 64 p.
- Cioffi-Revilla, C. 2010. A methodology for complex social simulations. *Journal of Artificial Societies and Social Simulations* 13(1): 7.
- De Sherbinin, A., 2011. The biophysical and geographical correlates of child malnutrition in Africa. *Population, Space and Place* 17: 27–46.
- Desta, S.; Coppock, D. L. 2004. Pastoralism under pressure: Tracking system change in Southern Ethiopia. *Human Ecology* 32(4): 465–486.
- Devereux and I. Scoones. 2006. The crisis of pastoralism? A response from Stephen Devereux and Ian Scoones. Future Agricultures Website. Sussex, UK: IDS.
- Drucker, A.G. 2007. Economics of livestock genetic resources conservation and sustainable use: State of the art. In: *Managing Biodiversity in Agricultural Ecosystems*, Jarvis, D. I.; Padoch, C.; Cooper, H. D. (Eds.). New York: Columbia University Press.
- Drucker, A.G. 2010. Where's the beef? The economics of AnGR conservation and its influence on policy design and implementation. *Animal Genetic Resources* 47: 85–90.
- Ericksen, P.; Thornton P.; Notenbaert, A.; Cramer, L.; Jones, P.; Herrero, M. 2011. *Mapping hotspots of climate change and food insecurity in the global tropics*. CCAFS Report Number 5. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture, and Food Security.
- Ewers, R.M.; Scharlemann, J.P.W.; Balmford, A.; Green, R.E. 2009. Do increases in agricultural yield spare land for nature? *Global Change Biology* 15(7): 1716–1726.
- Falkenmark, M. 1986. Fresh water – time for a modified approach. *Ambio* 15(4): 192–200.
- Ferraro, P. J. 2009. Regional review of payments for watershed services: sub-Saharan Africa. *Journal of Sustainable Forestry* 28(3–5): 525–550.
- Frison, E.A.; Cherfas, J.; Hodgkin, T. 2011. Agricultural biodiversity is essential for sustainable improvement in food and nutrition security. *Sustainability* 3: 238–253.
- Goklany, I. M. 2009. Is climate change the "defining challenge of our age?" *Energy and Environment* 20(3): 279–302.
- Haggblade S.; Tembo G. 2003. Conservation farming in Zambia. Environment and Production Technology Division, No.108, pp. 128. International Food Policy Research Institute.
- Halewood, M. (Ed.) 2011. *Farmers' Varieties and Farmers' Rights: Addressing Challenges in Taxonomy and Law*. London, UK: Earthscan.

- Hobbs, N. K. A., Thompson, G., Stokes, C. J.; Lockett, J. M.; Ash, A. J.; Boone, R.B.; Reid, R. S.; Thornton, P. K. 2008. Fragmentation of rangelands: Implications for humans, animals, and landscapes. *Global Environmental Change* 18: 776–785.
- Kibblewhite, M.G.; Ritz, K.; Swift, M.J. 2008. Soil health in agricultural systems. *Philosophical Transactions of the Royal Society B: Biological Sciences* 363 (1492): 685–701.
- Jack, B.K., 2009. Upstream–downstream transactions and watershed externalities: experimental evidence from Kenya. *Ecological Economics* 68(6): 1813–1824.
- Jackson, L.; van Noordwijk, M.; Bengtsson, J.; Foster, W.; Lipper, L.; Pulleman, M.; Said, M.; Snaddon, J.; Vodouhe, R. 2010. Biodiversity and agricultural sustainability: from assessment to adaptive management. *Current Opinions in Environmental Sustainability* 2: 80–87.
- Jarvis, D.I.; Brown, A.D.H.; Imbruce, V.; Ochoa, J.; Sadiki, M.; Karamura, E.; Trutmann, P.; Finckh, M.R. 2007. Managing crop disease in traditional agro-ecosystems: the benefits and hazards of genetic diversity, pp. 291–319. In: *Managing Biodiversity in Agricultural Ecosystems*, Jarvis, D.I.; Padoc, C.; Cooper, D. (Eds.) New York: Columbia University Press.
- Jarvis, D.I.; Brown, A.H.; Cuong, P.H.; Collado-Panduro, L.; Latournerie-Moreno, L.; Gyawali, S.; Tanto, T.; Sawadogo, M.; Mar, I.; Sadiki, M.; et al. 2008. A global perspective of the richness and evenness of traditional crop-variety diversity maintained by farming communities. *Proc. Natl. Acad. Sci. USA* 105: 5326–5331.
- Jarvis, D.I.; Hodgkin, T.; Sthapit, B.R.; Fadda, C.; Lopez-Noriega, I., 2011. A heuristic framework for identifying multiple ways of supporting the conservation and use of traditional crop varieties within the agricultural production system. *Critical Reviews in Plant Sciences* 30: 125–176.
- Jayne, T.S.; Mather, D.; Mghenyi, E. 2010. Principal challenges confronting smallholder agriculture in sub-Saharan Africa. *World Development* 38(10): 1384–1398.
- Lamprey, R. H.; Reid, R. S. 2004. Expansion of human settlement in Kenya’s Maasai Mara: what future for pastoralism and wildlife? *Journal of Biogeography* 31(6): 997–1032.
- Li, T.M. 2011. Centering labor in the land grab debate. *Journal of Peasant Studies* 38(2): 281–298.
- Little, P.; McPeak, J.; Barrett, C.; Kristjanson, P. 2008. Challenging orthodoxies: understanding poverty in pastoral areas of East Africa. *Development and Change* 39: 587–611.
- McKinsey & Company. 2009. Charting Our Water Future. Unpublished report.
- Mortimore, M., 2009. *Dryland Opportunities: a new paradigm for people, ecosystems, and development*. Gland, Switzerland: IUCN; London, UK, IIED; New York, USA: UNDP.
- Niamir-Fuller, M. 1998. The resilience of pastoral herding in Sahelian Africa. In: *Linking social and ecological systems for resilience and sustainability*, Berkes, F.; Colding, J.; Folke, C (Eds.). Cambridge, UK: Cambridge University Press.
- Nin-Pratt, A.; Jabbar, M.A.; Ehui, S. 2009. Benefits and costs of compliance of sanitary regulations in livestock markets: the case of Rift Valley Fever in the Somali region of Ethiopia. *Quarterly Journal of International Agriculture* 48 (3): 219–241.
- Oba, G.; Kaitira, L. M. 2004. Herder knowledge of landscape assessments in arid rangelands in northern Tanzania. *Journal of Arid Environments* 66 (2006): 168–186.
- Okumu, M. O.; van Asten P. J. A.; Kahangi, E.; Okech, S. H.; Jefwa, J.; Vanlauwe, B. 2011. Production gradients in smallholder banana (cv. Giant Cavendish) farms in Central Kenya. *Scientia Horticulturae* 127(4): 475–481.
- Oluoko-Odingo, A. A. 2011. Vulnerability and adaptation to food insecurity and poverty in Kenya. *Annals of the Association of American Geographers* 101(1): 1–20.

- Oweis, T.; Hachum, A. 2006. Water harvesting and supplemental irrigation for improved water productivity of dry farming systems in West Asia and North Africa. *Agricultural Water Management* 80: 57.
- Perfecto, I.; Vandermeer, J. 2010. The agroecological matrix as alternative to the land-sparing/agriculture intensification model. *Proceedings of the National Academy of Sciences* 170(13): 5786–5791.
- Phalan, B.; Balmford, A.; Green, R. E.; Scharlemann, J. P. W. 2011. Minimising harm to biodiversity of producing more food globally. *Food Policy* 36(Supp. 1): S62–S71.
- Reid, R.S.; Kruska, R. L.; Muthui, N.; Taye, A.; Wotton, S.; Wilson, C. J.; Mulatu, W. 2000. Land use and land cover-dynamics in response to changes in climatic, biological and socio-political forces: the case of Southern Ethiopia. *Landscape Ecology* 15(4): 339–355.
- Reid, R. S.; Nkedianye, D.; Said, M. Y.; Kaelo, D.; Neselle, M.; Makui, O.; Onetu, L.; Kiruswa, S.; Ole, N.; Kamuaro; Kristjanson, P.; Ogutu, J.; BurnSilver, S. B.; Goldman, M. J.; Boone, R. B.; Galvin, K. A.; Dickson, N. M.; Clark, W. C. 2009. *Evolution of models to support community and policy action with science: balancing pastoral livelihoods and wildlife conservation in savannas of East Africa*. PNAS.
- Reij, C.; Thiombiano, T. 2003. *Développement rural et environnement au Burkina Faso: la réhabilitation de la capacité productive des terroirs sur la partie nord du Plateau Central entre 1980 et 2001*. Rapport de synthèse. Ambassade Royal des Pays Bas: GTZ – Patecore; Ouagadougou: USAID. 82pp.
- Robertson, B.; Pinstrup-Andersen, P. 2010. Global land acquisition: neo-colonialism or development opportunity? *Food Security* 2(3): 271–283.
- Rockström, J.; Axberg, G. N.; Falkenmark, M.; Lannerstad, M.; Rosemarin, A.; Caldwell, I.; Arvidson, A.; Nordstrom M. 2005. *Sustainable pathways to attain the millennium development goals – assessing the role of water, energy and sanitation*. Stockholm, Sweden: Stockholm Environment Institute. Available at www.sei.se/mdg.htm.
- Rockström, J.; Karlberg, L.; Wani, S.P.; Barron, J.; Hatibu, N.; Oweis, T.; Bruggeman, A.; Farahani, J.; Qiang, J. 2010. Managing water in rainfed agriculture – the need for a paradigm shift. *Agricultural Water Management* 97(4): 543–550.
- Sahrawat K.; Wani S.; Pardhasaradhi G.; Murthy K. 2009. Diagnosis of secondary and micronutrient deficiencies and their management in rainfed agroecosystems: case study from Indian semi-arid tropics. *Communications in Soil science and Plant Analysis* 41: 1–15.
- Sanford, S.; Scoones, I. 2006. Opportunistic and conservative pastoral strategies: some economic arguments. *Ecological Economics* 58: 1–16.
- Sanginga, N.; Dashiell, K.; Okogun, J. A.; Thottappilly, G. 1997. Nitrogen fixation and N contribution by promiscuous nodulating soybeans in the southern Guinea savanna of Nigeria. *Plant and Soil* 195(2): 257–266.
- Smale, M. (Ed.) 2008. *Valuing Crop Biodiversity*. Oxford: CABI Publishing.
- Swallow, B.M.; Leimona, B.; Yatich, T.; Velarde, S. J. 2010. The conditions for functional mechanisms of compensation and reward for environmental services. *Ecology and Society* 15(4).
- Tabo, R.; Bationo, A.; Gerard, B.; Ndjeunga, J.; Marchal, D.; Amadou, B.; Annou, M. G ; Sogodogo, D.; Taonda, J-B.; Sibiry; Hassane, O.; Diallo, M.K.; Koala, S. 2006. Improving cereal productivity and farmers' income using a strategic application of fertilizers in West Africa, pp. 192–199. In: *Advances in integrated Soil Fertility Management in Sub Saharan Africa: Challenges and*

- Opportunities*, Bationo, A.; Waswa, B. S.; Kihara, J.; Kimetu, J. (Eds.). The Netherlands: Springer.
- Thomas, R. J. 2008. Opportunities to reduce the vulnerability of dryland farmers in Central and West Asia and North Africa to climate change. *Agriculture, Ecosystems and Environment* 126(1–2): 36–45.
- Tittonell, P.; Vanlauwe, B.; Corbeels, M.; Giller, K.E, 2008. Yield gaps, nutrient use efficiencies and response to fertilisers by maize across heterogeneous smallholder farms of western Kenya. *Plant and Soil* 313(1–2): 19–37.
- Twomlow, S.; Rohrbach, D.; Dimes, J.; Rusike, J.; Mupangwa, W.; Ncube, B.; Hove, L.; Moyo, M.; Mashingaidze, N.; Mahposa, P. 2010. Micro-dosing as a pathway to Africa’s Green Revolution: evidence from broad-scale on-farm trials. *Nutrient Cycling in Agroecosystems* 88: 3–15.
- Vanlauwe, B.; Tittonell, P.; Mukalama, J. 2006. Within-farm soil fertility gradients affect response of maize to fertilizer application in western Kenya. *Nutrient Cycling in Agroecosystems* 76(2–3): 171–182.
- Vanlauwe, B.; Bationo, A.; Chianu, J.; Giller, K.E.; Merckx, R.; Mkwunye, U.; Ohiokpehai, O.; Sanginga, N. 2010. Integrated soil fertility management: operational definition and consequences for implementation and dissemination. *Outlook on Agriculture* 39 (1): 17–24.
- Wani, S.; Rockström, J.; Oweis, T. 2009. *Rainfed Agriculture: Unlocking the Potential*. United Kingdom: CABI International.
- Wani, S. P.; Sahrawat, K. L.; Sreedevi, T. K.; Singh, P.; Pathak, P.; Kesava Rao, A. V. R. 2008. Efficient rainwater management for enhanced productivity in arid and semi-arid drylands. *Journal of Water Management* 15 (2): 126–140.
- Wani, S.P.; Pathak, P.; Jangawad, L.S.; Singh, P. 2003. Improved management of Vertisols in the semiarid tropics for increased productivity and soil carbon sequestration. *Soil Use and Management* 19: 217–222.
- Xie, K.; Wang, X.; Zhang, R.; Gong, Z.; Zhang, S.; Mares, V.; Gavilan, C.; Posadas, A.; Quiroz, R. 2011. Improving water utilization by the potato crop in semi-arid regions in China. 4th International Crop Science Congress.
- WISP. 2008. Policies that work for pastoral environments: a six-country review of positive policy impacts on pastoral environments. Nairobi, Kenya: IUCN.
- World Bank. 2010. Deep wells and prudence: towards pragmatic action for addressing groundwater overexploitation in India. Washington D.C.: World Bank.
- Wunder, S. 2005. Payments for environmental services: some nuts and bolts. CIFOR Occasional Paper, No. 42. Jakarta, Indonesia: CIFOR.

6. Strategic Research Portfolio: Resource Recovery and Reuse

- Adamtey, N.; Cofie, O.; Ofosu-Budu, G. K.; Forster, D. 2008. Turning waste into fertilizer. *Sandec News* 9: 16–17.
- Buechler, S. J. 2004. A sustainable livelihoods approach for action research on wastewater use in agriculture. In: *Wastewater use in irrigated agriculture: Confronting the livelihood and environmental realities*, Scott, C. A.; Faruqui, N. I.; Raschid-Sally, L. (Eds.). Wallingford, UK: CABI; Colombo, Sri Lanka: International Water Management Institute (IWMI); Ottawa, Canada: International Development Research Centre (IDRC).
- Bekunda, M.; Nteranya, S.; Woome, P. L., 2010. Restoring soil fertility in sub-Saharan Africa. *Advances in Agronomy* 108: 183–236.

- Cofie, O.; Kranjac-Berisavljevic, G.; Drechsel, P. 2005. The use of human waste for peri-urban agriculture in northern Ghana. *Renewable Agriculture and Food Systems* 20(2): 73–80.
- Cofie, O.; A. Olugbenga; Amoah, P. 2010. Introducing urine as an alternative fertiliser source for urban agriculture: case studies from Nigeria and Ghana. *UA Magazine* 23: 49–50.
- Cofie, O. O.; Drechsel, P.; Agbottah, S.; van Veenhuizen, R. 2009. Resource recovery from urban waste: options and challenges for community-based composting in sub-Saharan Africa. *Desalination* 248(1–3): 256–261.
- Cofie, O. O.; Murray, A. 2010. A compilation of reuse cases. In: *Report to the Bill and Melinda Gates Foundation*, v. 3, June 2010. Colombo, Sri Lanka: International Water Management Institute (IWMI).
- Drechsel, P.; Kunze, D. (Eds.). 2001. *Waste composting for urban and peri-urban agriculture: Closing the rural–urban nutrient cycle in sub-Saharan Africa*. Colombo, Sri Lanka: International Water Management Institute (IWMI); Rome, Italy: Food and Agriculture Organization of the United Nations (FAO); Wallingford, UK: CABI Publishing.
- Drechsel, P.; Gyiele, L.; Kunze, D.; Cofie, O. 2001. Population density, soil nutrient depletion, and economic growth in sub-Saharan Africa. *Ecological Economics* 38(2): 251–258.
- Drechsel, P.; Scott, C. A.; Raschid-Sally, L.; Redwood, M.; Bahri, A. (Eds.). 2010. *Wastewater irrigation and health: assessing and mitigation risks in low-income countries*. London, UK: Earthscan; Ottawa, Canada: International Development Research Centre (IDRC); International Water Management Institute (IWMI). 404p.
- Ensink, J. H. J.; van der Hoek, W.; Matsuno, Y.; Munir, S.; Aslam, M. R. 2002. *Use of untreated wastewater in peri-urban agriculture in Pakistan: risks and opportunities*. IWMI Research Report 064. Colombo, Sri Lanka: International Water Management Institute (IWMI). 27p.
- Esrey, S. A.; Andersson, I.; Hillers, A.; Sawyer, R. 2001. *Closing the loop: ecological sanitation for food security*. Publications on Water Resources No. 18. Stockholm, Sweden: Swedish International Development Cooperation Agency (SIDA). 107p. Available at www.ecosanres.org/pdf_files/closing-the-loop.pdf (accessed on August 30, 2011).
- Evans, A. E. V.; Drechsel, P. 2010. Landscape analysis of reuse of waste products. In: *Report to the Bill and Melinda Gates Foundation*, v. 3, June 2010. Colombo, Sri Lanka: International Water Management Institute (IWMI). 46p.
- Evans, A. E. V.; Raschid-Sally, L.; Cofie, O. 2010. Multi-stakeholder processes for managing wastewater use in agriculture, pp. 355–377. In: *Wastewater irrigation and health: Assessing and mitigating risk in low income countries*, Drechsel, P.; Scott, C. A.; Raschid-Sally, L.; Redwood, M.; Bahri, A. (Eds.). London, UK: Earthscan.
- Gichuru, M. P.; Bationo, A.; Bekunda, M. A.; Goma, H. C.; Mafongonya, P. L.; Mugendi, D. N.; Murwira, H. M.; Nandwa, S. M.; Nyathi, P.; Swift, M. J. 2003. *Soil fertility management in Africa: a regional perspective*. Nairobi, Kenya: Academic Science Publishers, African Academy of Sciences.
- Hartemink, A. E. 2006. Soil fertility decline: definitions and assessment, pp. 1618–1621. In: *Encyclopedia of soil science*, Lal, R. (Ed.). New York: Taylor and Francis.
- Hope, L.; Cofie, O.; Keraita, B.; Drechsel, P. 2009. Gender and urban agriculture: the case of Accra, Ghana. Chapter 4, pp. 65–78. In: *Women feeding cities: Mainstreaming gender in urban agriculture and food security*, Hovorka, A.; de Zeeuw, H.; Njenga, M. (Eds.). Warwickshire, UK: Practical Action.
- Huibers, F.; Redwood, M.; Raschid-Sally, L. 2010. Challenging conventional approaches to managing wastewater use in agriculture, pp. 287–301. In: *Wastewater irrigation and health:*

- Assessing and mitigating risk in low income countries*, Drechsel, P.; Scott, C. A.; Raschid-Sally, L.; Redwood, M.; Bahri, A. (Eds.). London, UK: Earthscan.
- Hussain, I.; Raschid, L.; Hanjra, M. A.; Marikar, F.; van der Hoek, W. 2002. *Wastewater use in agriculture: review of impacts and methodological issues in valuing impacts*. IWMI Working Paper 37. Colombo, Sri Lanka: International Water Management Institute. 60p.
- Jiménez, B.; Asano, T. 2008. Water reclamation and reuse around the world, pp. 3–26. In: *Water reuse: an international survey of current practice, issues and needs*, Jiménez, B.; Asano, T. (Eds.). London, UK: IWA Publishing.
- Karg, H.; Drechsel, P.; Amoah, P.; Jeitler, R. 2010. Facilitating the adoption of food-safety interventions in the street-food sector and on farms, pp. 319–335. In: *Wastewater irrigation and health: assessing and mitigating risk in low-income countries*, Drechsel, P.; Scott, C. A.; Raschid-Sally, L.; Redwood, M.; Bahri, A. (Eds.). London, UK: Earthscan; Ottawa, Canada: International Development Research Centre (IDRC); Colombo, Sri Lanka: International Water Management Institute (IWMI).
- Koné, D. 2010. Making urban excreta and wastewater management contributes to cities' economic development: a paradigm shift. *Water Policy* 12(4): 602–610.
- Murray, A.; Buckley, C. 2010. Designing reuse-oriented sanitation infrastructure: the design for service planning approach, pp. 303–318. In: *Wastewater irrigation and health: Assessing and mitigating risk in low-income countries*, Drechsel, P.; Scott, C. A.; Raschid-Sally, L.; Redwood, M.; Bahri, A. (Eds.). London, UK: Earthscan, Ottawa, Canada: International Development Research Centre (IDRC); International Water Management Institute (IWMI).
- Murray, A.; Drechsel, P. 2010. Why do some wastewater treatment facilities work when the majority fail? Case study from the sanitation sector in Ghana. *Waterlines* 30(2): 135–149.
- Otterpohl, R.; Grottker, M.; Lange, J. 1997. Sustainable water and waste management in urban areas. *Water Science and Technology* 35(9): 121–133.
- Qadir, M.; Wichelns, D.; Raschid-Sally, L.; Minhas, P. S.; Drechsel, P.; Bahri, A.; McCornick, P. 2007. Agricultural use of marginal-quality water – opportunities and challenges. In: *Water for food, water for life: A comprehensive assessment of water management in agriculture*, Molden, D. (Ed.). London, UK: Earthscan.
- Rosemarin, A.; de Bruijne, G.; Caldwell, I. 2009. The next inconvenient truth: peak phosphorus. *The Broker* 15: 6–9.
- Rosemarin, A.; Ekane, N.; Caldwell, I.; Kvarnström, E.; McConville, J.; Ruben, C.; Fogde, M. 2008. *Pathways for sustainable sanitation: achieving the Millennium Development Goals*. London, UK: IWA Publishing; Stockholm Sweden: Stockholm Environment Institute (SEI).
- Rothenberger, S.; Zurbrugg, C.; Enayetullah, I.; Sinha, A. H. M. 2006. *Decentralized composting for cities of low- and middle-income countries. A users' manual*. Dhaka, Bangladesh: Waste Concern; Zurich, Switzerland: Swiss Federal Institute of Aquatic Science and Technology (EAWAG). Available at www.eawag.ch/forschung/sandec/publikationen/swm/dl/decomp_Handbook_loRes.pdf (accessed on September 1, 2011).
- Rouse, J.; Rothenberger, S.; Zurbrugg, C. 2008. *Marketing compost. A guide for compost producers in low and middle-income countries*. Zurich, Switzerland: Swiss Federal Institute of Aquatic Science and Technology (EAWAG)/Department of Water and Sanitation in Developing Countries (SANDEC).
- Sanchez, P. A.; Swaminathan, M. S. 2005. Hunger in Africa: The link between unhealthy people and unhealthy soils. *The Lancet* 365(9457): 442–444.

- Scott, C. A.; Faruqui, N. I.; Raschid-Sally, L. (Eds.). 2004. *Wastewater use in irrigated agriculture: confronting the livelihood and environmental realities*. Wallingford, UK: CABI; Colombo, Sri Lanka: International Water Management Institute (IWMI); Ottawa, Canada: International Development Research Centre (IDRC).
- Seidu, A. R.; Drechsel, P.; Amoah, P.; Löfman, O.; Heistad, A.; Fodge, M.; Jenssen, P.; Stenström, T.-A. 2008. Quantitative microbial risk assessment of wastewater and faecal sludge reuse in Ghana. Paper presented at the 33rd WEDC International Conference, Accra, Ghana, April 7–11, 2008. pp. 90–97.
- UNDP (United Nations Development Programme). 1996. *Urban agriculture: Food, jobs and sustainable cities*. Publication Series for Habitat II, Volume One. New York, USA: United Nations Development Programme (UNDP).
- UNESCO (United Nations Educational, Scientific and Cultural Organization) – World Water Assessment Programme (WWAP). 2003. *Water for people, water for life*. The United Nations World Water Development Report. Paris, France: UNESCO Publishing; Oxford, UK: Berghahn Books.
- WHO (World Health Organization). 2006. *Guidelines for the safe use of wastewater, excreta and greywater*. Geneva, Switzerland: World Health Organization (WHO).

7. Strategic Research Portfolio: Improved Management of Water Resources in Major Agricultural River Basins

- Amarasinghe, U.; Sharma, B. R.; Aloysius, N.; Scott, C.; Smakhtin, V. U.; De Fraiture, C. 2004. *Spatial Variation In Water Supply And Demand Across The River Basins Of India*. IWMI Research Report N 83. Colombo, Sri Lanka: International Water Management Institute.
- Amarasinghe, U.; Shah, T.; Singh O. P. 2008. *Changing Consumption Patterns: Implications on Food and Water Demand in India*. Research Report 119. Colombo, Sri Lanka: International Water Management Institute.
- Biggs, T.W.; Gaur, A.; Scott, C.A.; Thenkabail, P.; Rao, P.G.; Gumma, M.K.; Acharya, S.; Turrall, H. 2007. *Closing of the Krishna Basin: Irrigation, Streamflow Depletion and Macroscale Hydrology*. Research Report 111. Colombo, Sri Lanka: International Water Management Institute.
- Cai, X.; Rosegrant, M. W.; Ringler, C. 2003. Physical and economic efficiency of water use in the river basin: implications for efficient water management. *Water Resources Research* 39(1). Comprehensive Assessment of Water Management in Agriculture. 2007. *Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture*. London: Earthscan; Colombo: International Water Management Institute.
- Cook S. E.; Fisher, M. J.; Andersson, M. S.; Rubiano, J.; Giordano, M. 2009. Water, food and livelihoods in river basins. *Water International* 34(1): 13–29.
- Giordano, M. and Villholth, K. (Eds). 2007. *The agricultural groundwater revolution: opportunities and threats to development*. Comprehensive Assessment of Water Management in Agriculture Series 3. Wallingford: IWMI and CAB International.
- Keller, A.; Keller, J.; Seckler, D. 1996. *Integrated water resource systems: theory and policy implications*. IWMI Research Report 003. Colombo, Sri Lanka: International Irrigation Management Institute (IIMI).

- Keller A.; Sakthivadivel R.; Seckler, D. 2000. *Water Scarcity and the Role of Storage in Development*. Research Report 39. Colombo, Sri Lanka: International Water Management Institute.
- Kite G.; Droogers, P. 2000. *Integrated Basin Modeling*. Research Report 43. Colombo, Sri Lanka: International Water Management Institute.
- Lankford, B. A.; Merrey, D. J.; Cour, J.; Hepworth, N. 2007. *From Integrated to Expedient: An Adaptive Framework for River Basin Management in Developing Countries*. Research Report 110. Colombo, Sri Lanka: International Water Management Institute.
- McCartney M. P.; Arranz R. 2007. *Evaluation of Historic, Current and Future Water Demand in the Olifants River Catchment, South Africa*. Research Report 118. Colombo, Sri Lanka: International Water Management Institute.
- McCartney, M.; Smakhtin, V. 2010. *Water Storage in an Era of Climate Change: Addressing the Challenge of Increasing Rainfall Variability*. IWMI Blue Paper. Colombo, Sri Lanka: International Water Management Institute.
- Molden, D. 1997. *Accounting for water use and productivity*. SWIM Paper 1. Colombo, Sri Lanka: International Irrigation Management Institute (IIMI).
- Molle, F.; Jayakody, P.; Ariyaratne R.; Somatilake, H.S. 2005. *Balancing Irrigation and Hydropower: Case Study from Southern Sri Lanka*. Research Report 94. Colombo, Sri Lanka: International Water Management Institute.
- Molle, F. 2003. *Development trajectories of river basins: a conceptual framework*. Research Report 072. Colombo, Sri Lanka: International Water Management Institute (IWMI). 32p.
- Molle, F.; Mamanpoush, A.; Miranzadeh, M. 2004. *Robbing Yadullahs water to irrigate Saeids garden: hydrology and water rights in a village of Central Iran*. Research Report 080. Colombo, Sri Lanka: International Water Management Institute (IWMI). 43p.
- Molle F.; Wester, P. (Eds). 2009. *River Basin Trajectories: Societies, Environment and Development*. Wallingford, UK: CABI; Colombo, Sri Lanka: IWMI. 320 pp.
- Sadoff, C. W.; Grey, D. 2002. Beyond the river: the benefits of cooperation on international rivers. *Water Policy* 4(5): 389–403.
- Ringler, C. 2001. *Optimal Allocation and Use of Water Resources in the Mekong River Basin: Multi-Country and Intersectoral Analyses*. Development Economics and Policy Series. Vol. 20. Peter Lang.
- Seckler, D. 1996. *The new era of water resources management: from "dry" to "wet" water savings*. IWMI Research Report 001 / II. Colombo, Sri Lanka: International Irrigation Management Institute (IIMI). 17p.
- Seckler, D.; Amarasinghe, U.; Molden, D.; de Silva, R.; Barker, R. 1998. *World Water Demand and Supply, 1990 to 2025: Scenarios and Issues*. Research Report 19. Colombo, Sri Lanka: International Water Management Institute.
- Smakhtin, V. U.; Revenga, C.; Döll, P. 2004. *Taking into account environmental water requirements in global-scale water resources assessments*. Research Report of the CGIAR Comprehensive Assessment Programme of Water Use in Agriculture. No. 2, Colombo, Sri Lanka: International Water Management Institute.
- Smakhtin, V.; Gamage, N.; Bharati, L. 2007. *Hydrological and environmental issues of inter-basin water transfers in India: a case of Krishna river basin*. IWMI Research Report 120. Colombo, Sri Lanka: International Water Management Institute.
- Wolf, A.; Natharius, J.; Danielson, J.; Ward, B.; Pender, J. 1999. International River Basins of the World. *International Journal of Water Resources Development*. 15 (4): 387–427.

- World Commission on Dams. 2000. *Dams and development – a new framework for decision making*. London, UK: Earthscan.
- Venot, J-P.; Turral, H.; Madar, S.; Molle, F. 2008. *Shifting Waterscapes: Explaining Basin Closure in the Lower Krishna Basin, South India*. Research Report 121. Colombo, Sri Lanka: International Water Management Institute.

8. Strategic Research Portfolio: Information Systems for Land, Water and Ecosystems

- Ballantyne P.; Maru, A.; Porcari, E. M. 2010. Information and Communication Technologies— Opportunities to Mobilize Agricultural Science for Development. *Crop Science* 50: S-63–S-69.
- Bjerklie, D. M.; Dingman, S. L.; Vorosmarty, C. J.; Bolster, C. H.; Congalton, R. G. 2003. Evaluating the potential for measuring river discharge from space. *Journal of Hydrology* 278: 17–38.
- Clark, W. C.; Tomich, T. P.; van Noordwijk, M.; Guston, D.; Catacutan, D.; Dickson, N. M.; McNie, E. 2011. Boundary work for sustainable development: natural resource management at the Consultative Group on International Agricultural Research (CGIAR). *Proceedings of the National Academy of Sciences USA*. 10.1073/pnas.0900231108.
- de Leeuw, J.; Georgiadou, Y.; Kerle, N.; de Gier, A.; Inoue, Y.; Ferwerda, J.; Smies, M.; Narantuya, D. 2010. The Function of Remote Sensing in Support of Environmental Policy. *Remote Sensing* 2: 1731–1750.
- de Fraiture, C. et al. 2007. Looking ahead to 2050: scenarios of alternative investment approaches pp. 91–145. In: *Water for food, water for life: a comprehensive assessment of water management in agriculture*, Molden, D. (Ed.). London, UK: Earthscan.
- Giller, K. E.; Leeuwis, C.; Andersson, J.-A.; Andriessse, W.; Brouwer, A.; Frost, P.; Hebinck, P.; Heitkönig, I.; van Ittersum, M.-K.; Koning, N.; Ruben, R.; Slingerland, M.; Udo, H.; Veldkamp, T.; van de Vijver, C.; van Wijk, M.-T.; Windmeijer, P. 2008. Competing claims on natural resources: what role for science? *Ecology and Society* 13: 34. [online] URL: <http://www.ecologyandsociety.org/vol13/iss2/art34/>.
- Paradzayi, C.; Ruther, H. 2002. Evolution of environmental information systems in Africa. *International Archives for Photogrametry, Remote Sensing and Spatial Information Service*. XXXIV (6): 73–77.
- Patching Together a World View. (2007). *Nature* 450(7171): 761.
- Posadas, A. N. D.; Quiroz, R.; Zorogastúa, P.; & León-Velarde, C. (2005). Multifractal characterization of the spatial distribution of Ulexite in a Bolivian salt flat. *International Journal of Remote Sensing* 26: 615–627.
- Nisbet, E. 2007. Cinderella science. *Nature* 450(6): 789–790.
- Sachs, J. D.; Remans, R.; Smukler, S.; Winowiecki, L.; Andelman, S. J.; Cassman, K. G.; Castle, D.; DeFries, R.; Denning, G.; Fanzo, J.; Jackson, L. E.; Leemans, R.; Lehmann, J.; Milder, J. C.; Naeem, S.; Nziguheba, G.; Palm, C. A.; Pingali, P. L.; Reganold, J. P.; Richter, D. D.; Scherr, S. J.; Sircely, J.; Sullivan, C.; Tomich, T. P.; Sanchez, P. A. 2010. Monitoring the world's agriculture. *Nature* 466(7306): 558–560.
- Tang, Q.; Gao, H.; Lu, H.; Lettenmaier, D. P. 2009. Remote sensing: hydrology. *Progress in Physical Geography* 33(4): 490–509.
- Vorosmarty, C.; Askew, A.; Grabs, W.; Barry, R. G.; Birkett, C.; Doll, P.; Goodison, B.; Hall, A.; Jenne, R.; Kitaev, L.; Landwehr, J.; Keeler, M.; Leavesley, G.; Shaake, J.; Strzepek, K.; Sundarvel, S. S.; Takeuchi, K.; Webster, F. 2002. Global water data: a newly endangered species. *EOS, Transactions of American Geophysical Union* 82(5): 54.

Wagner, W.; Verhoest, N. E. C. ; Ludwig, R.; Tedesco, M. 2009. Remote sensing in hydrological sciences. *Hydrol. Earth Syst. Sci.* 13: 813–817.

Appendix 1a: The science behind ecosystem services and resilience

- Becker, C. D. 1999. Protecting a garua forest in Ecuador: the role of institutions and ecosystem valuation. *Ambio* 28: 156–161.
- Berkes, F.; Colding, J.; Folke, C. (Eds.). 2003. *Navigating social-ecological systems: building resilience for complexity and change*. Cambridge, UK: Cambridge University Press.
- Berkes, F.; Seixas, C. S. 2005. Building resilience in lagoon social-ecological systems: a local-level perspective. *Ecosystems* 8 (8): 967–974.
- Boettinger, J. L.; Howell, D. W.; Moore, A. C.; Hartemink, A. E.; Kienast-Brown, S. (Eds.). 2010. *Digital soil mapping: Bridging research, environmental application, and operation*. Dordrecht, the Netherlands: Springer. 439p.
- Brand, F. S.; Jax, K. 2007. Focusing the meaning(s) of resilience: resilience as a descriptive concept and a boundary object. *Ecology and Society* 12(1): 23. Available at www.ecologyandsociety.org/vol12/iss1/art23/
- CA (Comprehensive Assessment of Water Management in Agriculture). 2007. *Water for food, water for life: A comprehensive assessment of water management in agriculture*. London: Earthscan; Colombo: International Water Management Institute.
- Cassman, K. G. 1999. Ecological intensification of cereal production systems: yield potential, soil quality, and precision agriculture. *Proceedings of the National Academy of Sciences of the United States of America* 96(11): 5952–5959.
- Chevassus-au-Louis, B.; Griffon, M. 2008. La nouvelle modernité: une agriculture productive a haute valeur écologique. *Déméter: Economie et Stratégies Agricoles* 14: 7–48.
- Clark, W. C. 2007. Sustainability science: A room of its own. Editorial. *Proceedings of the National Academy of Sciences of the United States of America* 104(6): 1737–1738.
- Cowling, R. M.; Egoh, B.; Knight, A. T.; O’Farrell, P. J.; Reyers, B.; Rouget, M.; Roux, D. J.; Welz, A.; Wilhelm-Rechman, A. 2008. Ecosystem services special feature: an operational model for mainstreaming ecosystem services for implementation. *Proceedings of the National Academy of Sciences of the United States of America* 105: 9483–9488.
- Costanza, R.; d’Arge, R.; de Groot, R.; Farber, S.; Grasso, M.; Hannon, B.; Limburg, K.; Naeem, S.; O’Neill, R. V.; Paruelo, J.; Raskin, R. G.; Sutton, P.; van der Belt, M. 1997. The value of the world’s ecosystem services and natural capital. *Nature* 387(6630): 253–260.
- Daily, G. C. 1997. *Nature’s services: Societal dependence on natural ecosystems*. Washington, DC: Island Press. 392p.
- Daily, G. C.; Ellison, K. 2002. *The new economy of nature*. Washington, DC, USA: Island Press. 250p.
- Daily, G. C.; Matson, P. A. 2008. Ecosystem services: From theory to implementation. *Proceedings of the National Academy of Sciences of the United States of America* 105(28): 9455–9456.
- Enfors, E. I.; Gordon, L. J. 2007. Analysing resilience in dryland agro-ecosystems: a case study of the Makanya catchment in Tanzania over the past 50 years. *Land Degradation & Development* 18(6): 680–696.
- FAO (Food and Agriculture Organization of the United Nations). 2008. *The state of food and agriculture 2008*. Rome: Food and Agriculture Organization of the United Nations (FAO).

- Available at www.fao.org/docrep/011/i0100e/i0100e00.htm (accessed on December 23, 2009).
- Fernandez, R. J.; Archer, E. R. M.; Ash, A. J.; Dowlatabadi, H.; Hiernaux, P. H. Y.; Reynolds, J. F.; Vogel, C. H.; Walker, B. H.; Wiegand, T. 2002. Degradation and recovery in socio-ecological systems: a view from the household/farm level. Chapter 17. pp. 297–323. In: *Global desertification: Do humans cause deserts?* Reynolds, J. F.; Stafford Smith, D. M. (Eds.). Berlin: Dahlem University Press.
- Fischer, J.; Brosi, B.; Daily, G. C.; Ehrlich, P.R.; Goldman, R.; Goldstein, J.; Lindenmayer, D. B.; Manning, A. D.; Mooney, H. A.; Pejchar, L.; Ranganathan, J.; Tallis, H. 2008. Should agricultural policies encourage land sparing or wildlife-friendly farming? *Frontiers in Ecology and the Environment* 6(7): 380–385.
- Fisher, B.; Costanza, R.; Turner, R.K.; Morling, P. 2007. Defining and classifying ecosystem services for decision making Working Paper - Centre for Social and Economic Research on the Global Environment (1), pp. 1-18
- Fisher, B.; Turner, R.K.; Morling, P. 2009. Defining and classifying ecosystem services for decision making. *Ecological Economics* 68 (3): 643–653.
- Gordon, L. J.; Finlayson, C. M.; Falkenmark, M. 2010. Managing water in agriculture for food production and other ecosystem services. *Agricultural Water Management* 97 (4): 512–519.
- Gunderson, L. H.; Holling, C. S. (Eds.). 2002. *Panarchy: Understanding transformations in human and natural systems*. Washington, DC, USA: Island Press. 450p.
- Hansen, M. C.; Stehman, S. V.; Potapov, P. V.; Loveland, T. R.; Townshend, J. R. G.; DeFries, R. S.; Pittman, K. W.; Arunarwati, B.; Stolle, F.; Steininger, M. K.; Carroll, M.; DiMiceli, C. 2008. Humid tropical forest clearing from 2000 to 2005 quantified by using multitemporal and multiresolution remotely sensed data. *Proceedings of the National Academy of Sciences of the United States of America* 105(27): 9439–9444.
- Holling, C. S.; Gunderson, L. H. 2002. Resilience and adaptive cycles, pp. 25–62. In: *Panarchy: Understanding transformations in human and natural systems*, Gunderson, L. H.; Holling, C. S. (Eds.). Washington, DC, USA: Island Press.
- IAASTD. 2009. Agriculture at a crossroads. In: *International Assessment of Agricultural Knowledge, Science and Technology for Development*, McIntyre, B. D., Herren, H. R.; Wakhungu J.; Watson R. T. (Eds.). Washington, DC, USA: Island Press.
- Kaimowitz, D.; Sheil, D. 2007. Conserving what and for whom? Why conservation should help meet basic human needs in the tropics. *Biotropica* 39(5): 567–574.
- Kareiva, P.; Marvier, M. 2007. Conservation for the people. *Scientific American* 297(4): 50–57.
- MA (Millennium Ecosystem Assessment). 2005. *Living beyond our means: Natural assets and human well-being*. Statement from the Board. Paris, France: United Nations Environment Programme (UNEP). 28p. Available at http://pdf.wri.org/ma_board_final_statement.pdf (accessed on August 22, 2011).
- NRC (National Research Council), Policy Division, Board on Sustainable Development. 1999. *Our common journey: A transition toward sustainability*. Washington, DC, USA: National Academy Press. 384p.
- Sachs, J. D.; Remans, R.; Smukler, S.; Winowiecki, L.; Andelman, S. J.; Cassman, K. G.; Castle, D.; DeFries, R.; Denning, G.; Fanzo, J.; Jackson, L. E.; Leemans, R.; Lehmann, J.; Milder, J. C.; Naeem, S.; Nziguheba, G.; Palm, C. A.; Pingali, P. L.; Reganold, J. P.; Richter, D. D.; Scherr, S. J.; Sircely, J.; Sullivan, C.; Tomich, T. P.; Sanchez, P. A. 2010. Monitoring the world's agriculture. *Nature* 466(7306): 558–560.

- Sachs, J. D.; Reid, W. V. 2006. Investments toward sustainable development. *Science* 312: 1002.
- Sayer, J. A.; Campbell, B. M. 2004. *The science of sustainable development: Local livelihoods and the global environment*. Cambridge, UK: Cambridge University Press.
- Sinclair, F. 2011. POLYSCAPE: Multiple criteria GIS toolbox for negotiating landscape scale ecosystem service provision. Presented at the Nile Basin Development Challenge Science and Reflection Workshop, Addis Ababa, May 4–6, 2011. Nairobi: ICRAF.
- Steffan-Dewenter, I.; Kessler, M.; Barkmann, J.; Bos, M. M.; Buchori, D.; Erasmi, S.; Faust, H.; Gerold, G.; Glenk, K.; Robbert Gradstein, S.; Guhardja, E.; Harteveld, M.; Hertel, D.; Höhn, P.; Kappas, M.; Köhler, S.; Leuschner, C.; Maertens, M.; Marggraf, R.; Migge-Kleian, S.; Mogeia, J.; Pitopang, R.; Schaefer, M.; Schwarze, S.; Sporn, S. G.; Steingrebe, A.; Tjitrosoedirdjo, S. S.; Tjitrosoemito, S.; Twele, A.; Weber, R.; Woltmann, L.; Zeller, M.; Tscharntke, T. 2007. Tradeoffs between income, biodiversity, and ecosystem functioning during tropical rainforest conversion and agroforestry intensification. *Proceedings of the National Academy of Sciences of the United States of America* 104(12): 4973–4978.
- Tallis, H.; Polasky, S. 2009. Mapping and valuing ecosystem services as an approach for conservation and natural-resource Management. *Annals of the New York Academy of Sciences* 1162: 265–283.
- Tallis, H.; Kareiva, P.; Marvier, M.; Chang, A. 2008. An ecosystem services framework to support both practical conservation and economic development. *Proceedings of the National Academy of Sciences of the United States of America* 105(28): 9457–9464.
- TEEB (The Economics of Ecosystems and Biodiversity). 2010. *The Economics of Ecosystems and Biodiversity: mainstreaming the economics of nature: A synthesis of the approach, conclusions and recommendations of TEEB*. Available at www.teebweb.org/LinkClick.aspx?fileticket=bYhDohL_TuM%3d&tabid=1278&mid=2357 (accessed on August 22, 2011).
- Tilman, D. 1999. Global environmental impacts of agricultural expansion: the need for sustainable and efficient practices. *Proceedings of the National Academy of Sciences of the United States of America* 96(11): 5995–6000.
- UNEP. 2009. The environmental food crisis—The environment's role in averting future food crises. A UNEP rapid response assessment. Available at http://new.unep.org/pdf/FoodCrisis_lores.pdf (verified 23 Dec. 2009). Nairobi, Kenya: UNEP.
- van Wilgen, B. W.; Cowling, R. M.; Burgers, C. J. 1996. Valuation of ecosystem services. *Bioscience* 46(3): 184–189.
- Villa, F.; Ceroni, M.; Bagstad, K.; Johnson, G.; Krivov, S. 2009. ARIES (ARTificial Intelligence for Ecosystem Services): A new tool for ecosystem services assessment, planning, and valuation. *BioEcon* 1–10.
- von Braun, J.; Byerlee, D.; Chartres, C.; Lumpkin, T.; Olembo, N.; Waage, J. 2009. Towards a strategy and results framework for the CGIAR. Draft report by the Strategy Team, October 21, 2009. Available at <http://alliance.cgxchange.org/strategy-and-results-framework-team-reports/CGStrategyTeamreport10-21-09.pdf?attredirects=0&d=1> (accessed on August 22, 2011).
- Walker, B.; Sayer, J.; Andrew, N. L.; Campbell, B. 2010. Should enhanced resilience be an objective of natural resource management research for developing countries? *Crop Science* 50(2): S10–S19. Available at

www.sciencecouncil.cgiar.org/fileadmin/user_upload/sciencecouncil/Reports/CROP_SCIENCE_FOR_WEB.pdf (accessed on August 22, 2011).

Zhang, W.; Ricketts, T. H.; Kremen, C.; Carney, K.; Swinton, S. M. 2007. Ecosystem services and dis-services to agriculture. *Ecological Economics* 64: 253–260.

Appendix 1b: The science behind water scarcity

ABS. 2006. Water Account, Australia – 2004-05. ABS Cat. No. 4610.0 On-line 26 May 2010.

Available at

<http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/3494F63DFEE158BFCA257233001C>

E732/\$File/46100_2004-05.pdf

Ahmad, S., 2007. Land and water resources of Pakistan – A critical assessment. *Pakistan Development Review* 46 (4): 911–937 and 1214–1215.

Ahmad, M.D.; Turrall, H.; Nazeer, A. 2009 Diagnosing irrigation performance and water productivity through satellite remote sensing and secondary data in a large irrigation system of Pakistan. *Agricultural Water Management* 96(4): 551–564.

Alcamo, J.; Henrichs, T.; Rosch, T. 2000. World water in 2025: global modeling and scenario analysis. In: *World Water Scenarios Analyses*, Rijsberman, F.R. (Ed.). Marseille, France: World Water Council.

Bastiaanssen, W. G. M.; Noordman, E. J. M.; Pelgrum, H.; Davids, G.; Thoreson, B. P.; Allen, R. G., 2005. SEBAL model with remotely sensed data to improve water-resources management under actual field conditions. *Journal of Irrigation and Drainage Engineering* 131 (1): 85–93.

Bennett, J., 2003. Opportunities for increasing water productivity of CGIAR crops through plant breeding and molecular biology. In: *Water Productivity in Agriculture: Limits and Opportunities for Improvement*, Kijne, J.W.; Barker, R.; Molden, D. (Eds.). Wallingford, UK: CABI Publishing; Colombo, Sri Lanka: International Water Management Institute.

Bindraban, P.S.; Verhagen, A.; Uithol, P. W. J.; Henstra, P. 1999. A land quality indicator for sustainable land management: the yield gap. Report 106. Wageningen, Netherlands: Research Institute for Agrobiology and Soil Fertility. 145p.

Bouman, B.; Barker, R.; Humphreys, E.; Tuong, T.P.; Atlin, G.; Bennett, J.; Dawe, D.; Dittert, K.; Dobermann, A.; Facon, T.; Fujimoto, N.; Gupta, R.; Haefele, S.; Hosen, Y.; Ismail, A.; Johnson, D.; Johnson, S.; Khan, S.; Shan, L.; Masih, I.; Matsuno, Y.; Pandey, S.; Peng, T.; Muthukumarisami, T.; Wassman, R. 2007. Rice: feeding the billions, pp. 515–549. In: *Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture*. Molden, D. (Ed.). London, UK: Earthscan; Colombo, Sri Lanka: IWMI.

Breman, H.; Groot, J. J. R.; van Keulen, H., 2001. Resource limitations in Sahelian agriculture. *Global Environmental Change* 11 (1): 59–68.

Cai, X.; Sharma, B. R.; Matin, M. A.; Sharma, D.; Gunasinghe, S. 2010. *An assessment of crop water productivity in the Indus and Ganges river basins: Current status and scope for improvement*. IWMI Research Report 140. Colombo, Sri Lanka: International Water Management Institute. 30p.

Chalmers, K.; Godfrey, J.; Lynch, B. 2010, Globalising water accounting: Lessons from the globalisation of financial reporting, pp. 1–31. In: *AFAANZ 2010: Accounting and Finance Association of Australia and New Zealand Annual Conference*. Christchurch, New Zealand: AFAANZ.

- Chartres, C.; Varma, S. 2010. *Out of water: from abundance to scarcity and how to solve the world's water problems*. Upper Saddle River, NJ, USA: FT Press. 230p.
- Falkenmark, M.; Lundqvist, J.; Widstrand, C. 1989. Macro-scale water scarcity requires micro-scale approaches. Aspects of vulnerability in semi-arid development. *Natural Resources Forum* 13(4): 258–267.
- FAO (Food and Agriculture Organization of the United Nations). 2006. *World Agriculture: Towards 2030/2050*. Interim Report. Rome, Italy: FAO.
- de Fraiture, C. et al., 2007. Looking ahead to 2050: scenarios of alternative investment approaches, pp. 91–145. In: *Water for food, water for life: a comprehensive assessment of water management in agriculture*, Molden, D. (Ed.). London, UK: Earthscan.
- de Fraiture, C.; Molden, D.; Wichelns, D. 2010. Investing in water for food, ecosystems, and livelihoods: An overview of the comprehensive assessment of water management in agriculture. *Agricultural Water Management*, 97(4): 495–501.
- Garrity, D. P. 2004. Agroforestry and the achievement of the Millennium Development Goals. *Agroforestry Systems* 61: 5–17.
- Geist, H. J.; Lambin, E. F. 2004. Dynamic causal patterns of desertification. *BioScience* 54(9): 817–829.
- Hellegers P. J. G. J and Perry. C. J. 2006. Can irrigation water use be guided by market forces? *Theory and Practice. Water Resources Development* 22 (1): 79–86.
- Loeve, R.; Dong, B.; Hong, L.; Chen, C.D.; Zhang, S.; Barker, R. 2007. Transferring water from irrigation to higher valued uses: a case study of the Zhanghe irrigation system in China. *Paddy and Water Environment* 5 (4): 263–269.
- MA (Millennium Ecosystem Assessment). 2003. *Ecosystems and human well-being: a framework for assessment*. A report of the conceptual framework working group of the Millennium Ecosystem Assessment. Washington, DC: Island Press. Available at http://pdf.wri.org/ecosystems_human_wellbeing.pdf (accessed on August 23, 2011).
- Mainuddin, M. and Kirby. M. 2009. Spatial and temporal trends of water productivity in the lower Mekong River Basin. *Agricultural Water Management* 96(11): 1567–1578.
- Molden, D. 1997. *Accounting for water use and productivity*. SWIM Paper 1. Colombo, Sri Lanka: International Irrigation Management Institute (IIMI). 25p.
- Molden, D.; Frenken, K.; Barker, R.; de Fraiture, C.; Mati, B.; Svendsen, M.; Sadoff, C. W.; Finlayson, M.; Atapattu, S.; Giordano, M.; Inocencio, A.; Lannerstad, M.; Manning, N.; Molle, F.; Smedema, B.; Vallee, D. 2007. Trends in water and agricultural development, pp. 57–89. In: *Water for food, water for life: a Comprehensive Assessment of Water Management in Agriculture*, Molden, D. (Ed.). London, UK: Earthscan; Colombo, Sri Lanka: International Water Management Institute (IWMI).
- Molden. D.; Oweis, T.; Steduto, P.; Bindraban, P.; Hanjra, M. A.; Kijne, J. 2010. Improving agricultural water productivity: between optimism and caution. *Agricultural Water Management* 97(4): 528–535.
- Molle, F.; Berkoff, J. 2006. *Cities versus agriculture: Revisiting intersectoral water transfers, potential gains and conflicts*. Comprehensive Assessment of Water Management in Agriculture Research Report 010. Colombo, Sri Lanka: International Water Management Institute (IWMI), Comprehensive Assessment Secretariat. 76p.
- Molle, F.; Mamanpoush, A.; Miranzadeh, M. 2004. Robbing Yadullah's water to irrigate Saeid's garden: hydrology and water rights in a village of Central Iran. Research Report 80. Colombo, Sri Lanka: International Water Management Institute.

- Oweis, T.Y.; Hachum, A.Y., 2003. Improving water productivity in the dry areas of west Asia and North Africa. In: *Water Productivity in Agriculture: Limits and Opportunities for Improvement*, Kijne, J.W.; Barker, R.; Molden, D. (Eds.). Wallingford, UK: CABI Publishing; Colombo, Sri Lanka: International Water Management Institute.
- Peden, D.; Tadesse, G.; Misra, A.K.; Ahmed, F.A.; Astatke, A.; Ayalneh, W.; Herrero, M.; Kiwuwa, G.; Kumsa, T.; Mati, B.; Mpairwe, D.; Wassenaar, T.; Yimegnihal, A. 2007. Water and livestock for human development, pp. 485–514. In: *Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture*. Molden, D. (Ed.). Earthscan/IWMI, London, UK/Colombo, Sri Lanka.
- Perry, C. 2007. Efficient irrigation; inefficient communication; flawed recommendations. *Irrigation and Drainage* 56(4): 367–378.
- Raskin, P.; Gleick, P.; Kirshen, P.; Pontius, G.; Strzepek, K. 1997. *Water Futures: Assessment of Long-range Patterns and Problems*. Background Report for the Comprehensive Assessment of the Freshwater Resources of the World. Stockholm, Sweden: Stockholm Environment Institute. 78pp.
- Rijsberman, F. R. 2006. Water Scarcity: Fact or Fiction? *Agricultural Water Management* 80(1–3): 5–22.
- Rockström, J.; Lannerstad, M.; Falkenmark, M. 2007. Assessing the water challenge of a new green revolution in developing countries. *Proceedings of the National Academy of Sciences of the United States of America* 104 (15): 6253–6260.
- Rosegrant, M.; Cai, X.; Cline, S. 2002. *World water and food to 2025. Dealing with scarcity*. Washington D. C.: IFPRI.
- Sanchez, P. A. 2002. Soil fertility and hunger in Africa. *Science* 295(5562): 2019–2020.
- Scherr, S. J.; McNeely, J. A. (Eds.). 2009. *Farming with nature: The science and practice of ecoagriculture*. Washington, DC, USA: Island Press. 445p.
- Seckler, D. 1996. *The new era of water resources management: From 'dry' to 'wet' water savings*. IIMI Research Report 1. Colombo, Sri Lanka: International Irrigation Management Institute (IIMI). 20p.
- Seckler, D.; Amarasinghe, U. Molden, D. de Silva, R.; Barker, R. 1998. *World Water Demand and Supply, 1990 to 2025: Scenarios and Issues*. Research Report 19. Colombo, Sri Lanka: International Water Management Institute.
- Shiklomanov, I. A., 1991. The world's water resources, pp. 93–126. In: *Proceedings of the International Symposium to Commemorate 25 Years of the IHP*, UNESCO/IHP, Paris, France.
- UN. 2007. System of Environmental Economic Accounting for Water (Online 331 pp). July 2011. Available at <http://unstats.un.org/unsd/envaccounting/SEEAWDraftManual.pdf>
- UN. 2009. Global Assessment of Water Statistics and Water Accounting. Background document.
- UNEP (United Nations Environment Programme). 2007. *Global Environmental Outlook (GEO-4): Environment for development*. Nairobi: United Nations Environment Programme. 540p. Available at www.unep.org/geo/geo4/report/GEO-4_Report_Full_en.pdf (accessed on August 23, 2011).
- Vanlauwe, B.; Bationo, A.; Chianu, J.; Giller, K. E.; Merckx, R.; Mokwunye, U.; Ohiokpehai, O.; Pypers, P.; Tabo, R.; Shepherd, K. D.; Smaling, E. M. A.; Wooster, P. L.; Sanginga, N. 2010. Integrated soil fertility management: operational definition and consequences for implementation and dissemination. *Outlook on Agriculture* 39(1): 17–24.
- Verdegem, M. C. J.; Bosma, R.H.; Verreth, J. A. J. 2006. Reducing water use for animal production through aquaculture. *Water Resources Development* 22(1): 101–113.

- Vlek, P. L. G.; Kühne, R. F.; Denich, M. 1997. Nutrient resources for crop production in the tropics. *Philosophical Transactions of the Royal Society London B* 352(1356): 975–985.
- Vlek, P. L. G.; Hillel, D.; Braimoh, A. K. 2008. Soil degradation under irrigation, pp. 101–119. In: *Land Use and Soil Resources*, Braimoh, A. K.; Vlek, P. L. G. (Eds.). Dordrecht: Springer Science Business Media B.V.
- Vogt, J. V.; Safriel, U.; Von Maltitz, G.; Sokona, Y.; Zougmore, R.; Bastin, G.; Hill, J. 2011. Monitoring and assessment of land degradation and desertification: towards new conceptual and integrated approaches. *Land Degradation & Development* 22(2): 150–165.
- Voortman, R. L. 2010. *Explorations into African land resource ecology: On the chemistry between soils, plants and fertilizers*. PhD thesis. Amsterdam: VU University. Available at <http://dare.uvu.vu.nl/bitstream/1871/15943/1/dissertation.pdf> (accessed on August 24, 2011).
- Vörösmarty, C. J.; Green, P.; Salisbury, J.; Lammers, R. B., 2000. Global Water Resources: Vulnerability from Climate Change and Population Growth. *Science* 289(5477): 284–288.
- Wagner, W.; Verhoest, N. E. C.; Ludwig, R.; Tedesco, M. (Eds.). 2009. Remote sensing in hydrological sciences. *Hydrology and Earth System Sciences* 13: 813–817.
- Ward, F. A.; Michelsen, A. M. 2002. The Economic Value of Water in Agriculture: Concepts and Policy Applications. *Water Policy* 4: 423–446.
- Wezel, A.; Soldat, V. 2009. A quantitative and qualitative historical analysis of the scientific discipline agroecology. *International Journal of Agricultural Sustainability* 7(1): 3–18.
- Young, A. 1998. *Land resources: Now and for the future*. Cambridge, UK: Cambridge University Press. 331p.
- Sander J.; Wim, Z.; Bastiaanssen, G. M.; de Fraiture, C.; Molden, D. J. 2010. A global benchmark map of water productivity for rainfed and irrigated wheat. *Agricultural Water Management* 97 (10): 1617–1627.

Appendix 1c: The science behind managing land degradation

- Garrity, D. P. 2004. Agroforestry and the achievement of the millennium development goals. *Agroforestry Systems* 61: 5–17.
- Geist, H. J.; Lambin, E. F., 2004. Dynamic Causal Patterns of Desertification. *BioScience* 54: 817–829.
- Millennium Ecosystem Assessment, 2003. *Millennium Ecosystem Assessment: Ecosystems and Human Well-being: A Framework for Assessment*. Washington, D.C.: World Resources Institute, Island Press.
- Sanchez, P. A. 2002. Soil fertility and hunger in Africa. *Science* 295 (5562): 2019–2020.
- Scherr, S.; McNeely, J. (Eds.). 2009. *Farming with Nature: The Science and Practice of Ecoagriculture*. Washington, D.C.; Island Press.
- UNEP, 2007. *Global Environmental Outlook (GEO-4): Environment for Development*. Valleta, Malta: United Nations Environment Programme. Progress Press Ltd.
- UNEP, 2011. *Land Health Surveillance: An Evidence-Based Approach to Land Ecosystem Management. Illustrated with a Case Study in the West Africa Sahel*. Shepherd, K.D. (Ed). Nairobi, Kenya: United Nations Environment Programme and the World Agroforestry Centre.
- Vanlauwe, B.; Bationo, A.; Chianu, J.; Giller, K. E.; Merckx, R.; Mokwunye, U.; Ohiokpehai, O.; Pypers, P.; Tabo, R.; Shepherd, K.; Smaling, E.; Woomer, P. L.; Sanginga, N. 2010. Integrated

- soil fertility management: operational definition and consequences for implementation and dissemination. *Outlook on Agriculture* 39(1): 17–24.
- Vlek, P. L. G.; Kühne, R. F.; Denich, M. 1997. Nutrient resources for crop production in the tropics. *Philosophical Transactions of the Royal Society London B* 352(1356): 975–985.
- Vlek, P.L.G.; Hillel, D.; Braimoh, A. K. 2008. Soil degradation under irrigation, pp. 101–119. In: *Land Use and Soil Resources*. Braimoh, A. K.; Vlek, P. L. G. (Eds.). Dordrecht: Springer Science 7 Business Media B.V.
- Vogt, J. V.; Safriel, U.; Von Maltitz, G.; Sokona, Y.; Zougmore, R.; Bastin, G.; Hill, J. 2011. Monitoring and assessment of land degradation and desertification: towards new conceptual and integrated approaches. *Land Degradation and Development*, in press.
- Voortman, R. L. 2010. Explorations into African Land Resource Ecology: On the chemistry between soils, plants and fertilizers. PhD thesis, University of Wageningen, the Netherlands.
- Wagner, W.; Verhoest, N. E. C.; Ludwig, R.; Tedesco, M. 2009. Remote sensing in hydrological sciences. *Hydrol. Earth Syst. Sci.* 13: 813–817.
- Wezel, A.; Soldat, V. 2009. A quantitative and qualitative historical analysis of the scientific discipline agroecology. *International Journal of Agricultural Sustainability* 7 (1): 3–18.
- Young, A. 1998. *Land Resources Now and for the Future*. Cambridge University Press, Cambridge, UK.