

CURRICULUM VITAE: KONRAD JOHAN WESSELS

CONTACT INFORMATION

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- Postal address: Meraka Institute, CSIR, PO Box 395, Pretoria, 0001, South Africa

PERSONAL INFORMATION:

- Date of birth: 11 July 1971
- Married

EDUCATION

- **2005-2006: Postdoc / Research Associate, NASA Goddard Space Flight Center**, Hydrospheric and Biospheric Sciences Laboratory, Greenbelt, MD and University of Maryland - Baltimore County (UMBC), MD.
- **2001-2005: PhD University of Maryland (UMD)**, Department of Geography. Thesis title: *Monitoring land degradation in Southern Africa by assessing changes in Primary Productivity*. Supervisor: Prof. Stephen D. Prince.
- **1995-97: MSc Cum Laude, University of Pretoria, South Africa (UP)**, Conservation Biology / Landscape Ecology, Department of Zoology. Thesis title: *Biodiversity assessment and conservation planning: the gradsect survey method and the use of local scale surrogate information*. Supervisor: Prof. A.S. Van Jaarsveld
- **1993: BSc Honours (UP)**
- **1990-92: BSc (UP)**

POSITIONS AND APPOINTMENTS

- **Honourary senior lecturer, WITS**, School of Geography, Archaeology and Environmental Studies
- **2006 (Aug.) to present:** Research Group Leader, Remote Sensing Research Unit (RSRU), Meraka Institute for Advanced Information and Communication Technology, CSIR, Pretoria.
- **2005 (Aug.) - 2006 (Aug.):** Research Associate, NASA/Goddard Space Flight Center, Hydrospheric and Biospheric Sciences Laboratory and Goddard Earth Sciences Technology Centre, University of Maryland Baltimore County.
- **2002-2005 (Aug.):** Research assistant, Geography Department, UMD. Supervisor: Dr. Stephen D. Prince. The work involved analyzing trends in relationship between net primary productivity (NPP) and climate variables at a global scale.
- **2001-2004:** Research assistant, Geography Department, UMD, Supervisor Dr. Ruth DeFries. NASA funded Project entitled, Land Use Change in and

- Around Protected Areas in LCLUC Sites: Synthesis of Rates and Consequences for Biodiversity. Responsibilities included mapping land cover with MODIS and Landsat satellite data.
- **1997-2001:** Researcher, Agricultural Research Council - Institute for Soil, Climate and Water, Remote Sensing and Geo-Informatics Division, South Africa. Promoted to Senior Researcher in 2001. Responsibilities included: project proposal writing, project management, statistical analyses, satellite image processing, field survey planning and implementation, final report writing, producing final remote sensing products and communicating results to funding agencies and data users.
 - **1995-1997:** MSc student researcher. University of Pretoria, Conservation Planning GIS Laboratory and DeBeers Venetia-Limpopo Nature Reserve. Applied algorithms in GIS to analyze landscape pattern and identify priority conservation areas.
 - **1994:** Field assistant. U.S. Geological Surveys, Biological Resources Division (formerly National Biological Surveys), Boise Idaho, USA.
 - **1994:** Field assistant. US Fish and Wildlife Service, Juneau, Alaska.

REFEREED PUBLICATIONS

- Olivier J.C. and Wessels K.J. (in Review) Detection of land cover change using an Artificial Neural Network and a Temporal Sliding Window on MODIS time series data. *IEEE Geosciences and Remote Sensing Letters*
- Wessels, K.J., Prince, S.D., and Reshef, I. (2008) Mapping land degradation by comparison of vegetation production to spatially-derived estimates of potential production. *Journal of Arid Environments*. 72, 1940-1949.
- Wessel K.J., Prince S.D., M. Carroll and J. Malherbe (2007) Relevance of rangeland degradation in semi-arid Northeastern South Africa to the non-equilibrium theory. *Ecological Applications*. 17, 815-827
- Prince S.D., Wessels K.J., Tucker C.J. and Nicholson S.E. (2007) Desertification in the Sahel: a reinterpretation of a reinterpretation. *Global Change Biology*.13, 1308-1313.
- Wessels K.J., Prince S.D., Malherebe J., Small J. and P.E. Frost (2007) Can human-induced land degradation be distinguished from the effects of rainfall variability? A case study in South Africa. *Journal of Arid Environments*, 68, 271-297.
- Wessels K.J., Prince S.D., Zambatis N., Macfadyen S., Frost P.E. and D. VanZyl (2006) Relationship between herbaceous biomass and 1km² Advanced Very High Resolution Radiometer (AVHRR) NDVI in Kruger National Park, South Africa. *International Journal of Remote Sensing*, 27, 951-973.
- Wessels K.J., S.D. Prince, Frost P.E., van Zyl D. (2004) Assessing the effects of human-induced land degradation in the former homelands of northern South Africa with a 1km AVHRR NDVI time-series. *Remote Sensing of Environment*, 91, 47-67.

- Wessels K.J., DeFries, R., Anderson L.O., Hansen A.J., Powell, S.L. and Moran E.F. (2004) Mapping regional land cover with MODIS data for biological conservation: Examples from the Greater Yellowstone Ecosystem, USA and Pará State, Brazil. *Remote Sensing of Environment* 92, 67-83.
- Wessels K.J., Reyers B., Van Jaarsveld A.S. and Rutherford M.C. (2003) Identification of potential conflict areas between land transformation and biodiversity conservation in north-eastern South Africa. *Agriculture, Ecosystems and Environment* 95, 157-178.
- McCarthy J.M., Gumbricht T., McCarthy T., Frost P.E., Wessels K.J. and Seidel F. (2003) Flooding Patterns of the Okavango Wetland in Botswana between 1972 and 2000. *Ambio*, 32, 453-457.
- Gumbricht T., McCarthy T.S., McCarthy J.M., Roy D., Frost P.E., Wessels K.J. (2002) Remote sensing to detect sub-surface peat fires and peat fire scars in the Okavango delta, Botswana. *South African Journal of Science* 98, 351-358.
- Reyers B., Wessels K.J. and van Jaarsveld A.S (2002) An assessment of biodiversity surrogacy options in the Limpopo Province of South Africa. *African Zoology* 37, 185-195.
- Erasmus B.F.N., Van Jaarsveld A.S. Chown S.L., Kshatriya M. and Wessels K.J. (2002) Vulnerability of South African animal taxa to climate change. *Global Change Biology* 8, 679-693.
- Reyers B., Fairbanks D.H.K., Wessels K.J., and Van Jaarsveld A.S. (2002) A multicriteria approach to reserve selection: Addressing long-term biodiversity maintenance. *Biodiversity and Conservation* 11, 769-793.
- Wessels K.J., Reyers B. and Van Jaarsveld A.S. (2000) Incorporating land cover information into regional biodiversity assessments in South Africa. *Animal Conservation* 3, 67-79.
- Wessels K.J., Freitag S. and Van Jaarsveld A.S. (1999) The use of Land Facets as Biodiversity Surrogates during reserve selection at a Local Scale. *Biological Conservation* 89, 21-38.
- Wessels K.J., Grimbeek J.D., Van Der Linde M.J. and Van Jaarsveld A.S. (1998) An Evaluation of the Gradsect Biological Survey method. *Biodiversity and Conservation* 7, 1093-1121.
- Wessels K.J. and van der Merwe, M. (1997) Facultative spermatozoa storage by female Geoffroy's horseshoe bat (*Rhinolophus clivosus*). *Canadian Journal of Zoology* 75: 2142-2146.

OTHER PUBLICATIONS

- Wessels, K. and Prince, S. (2007) Monitoring land degradation with long-term satellite data in South Africa. In: *The Full Picture*. Edited by Group on Earth Observations (GEO) Secretariat. ISBN 978-92-990047-0-8
- Contributing author. Dryland Systems. Ch. 22, (2005) In: *Ecosystems and Human Well-being: Current State and Trends, edited by the Millennium Ecosystem Assessment*, Island Press, Washington DC

- Wessels K.J. van Den Berg, H.M. and Pretorius D.J. (2000) Spatial Natural Resource Monitoring in the Mpumalanga Province of South Africa. In: *Response to Land Degradation*. Eds E.M. Bridges, I.D. Hannam, L.R. Oldeman, F.W.T. Penning de Vries, S.J. Scherr and Samran Sombatpanit, Science Publishers Inc., New Hampshire, USA. ISBN: 1578081521
- Newby T.S. and Wessels K.J. (Eds) (1997) *Report on the extent of Natural Resource Degradation in South Africa*. ARC-ISCW Report: GW/A/97/57, Pretoria.
- Wessels K.J. (1999) Quantifying the impact of human activities on biodiversity. In: *Framework on Natural Resource Accounting in SA*. Department of Environmental Affairs and Tourism report. Pretoria.

ORAL PAPERS PRESENTED

- Detection of land cover change using an artificial neural network within a temporal sliding window on modis time series data. IGARSS 2008, Boston.
- Monitoring desertification's impact on vegetation production in South Africa using long-term AVHRR and MODIS data: A test of the non-equilibrium rangeland theory. 32nd International Symposium on Remote Sensing of Environment Sustainable Development through Global Earth Observations June 25-29, 2007, San Jose, Costa Rica ISBN: 978-0-932913-12-8
- Monitoring land degradation by assessing primary productivity with satellite data. Seminar NASA GSFC, Greenbelt, USA, 2005.
- Distinguishing human-induced land degradation from natural landscape and climate variability. Seminar ARC Institute for Soil, Climate and Water, Pretoria, South Africa (SA), 2005.
- Taking land cover transformation into account during Biodiversity assessments in South Africa. *Society for Conservation Biology annual conference*, Missoula, Montana, USA, 2000.
- Spatial Natural Resource Monitoring. 2nd *International Land Degradation Conference*, Khon Kaen, Thailand, 1999.
- Spatial natural resource monitoring in Mpumalanga. *Earth Decision Information Systems Annual conference* 1999 CSRI, Pretoria, SA. 1999
- Natural Resource Monitoring with Remote Sensing. *Decision Support in Agriculture Symposium* (ARC-ISCW), Mpekwini Sun, SA, 1998.
- Land cover change finally has a say in Regional Biodiversity Assessments. *Annual Zoological Society of Southern Africa Symposium*. Durban, SA, 1998.
- Mapping and Monitoring alien vegetation with the aid of Remote Sensing. *Alien Invader Vegetation Workshop*, National Department Agriculture / ARC-PPRI, Pretoria, SA, 1998.
- The use of GIS in Biodiversity Conservation. *TAGIS meeting*, Eskom, Johannesburg, SA, 1997.

POSTERS PRESENTED

- Steenkamp K., Wessels K.J., Archibald S. and von Maltitz G. Long-term phenology and variability of southern African vegetation. (2008) IGARSS, Boston.
- Olivier J.C., Araya, S.T. and Wessels, K.J. (2007) Detection of land cover change using an Artificial Neural Network on a time-series of MODIS satellite data. Pattern Recognition Association of South Africa (PRASA). Pietermaritzburg.
- Wessels K.J. and Prince S.D. (2004) Did “Apartheid” cause land degradation in the former homelands of South Africa? - Assessing ecosystem function with 17 years of 1km AVHRR NDVI data. *Earth Science Scholars Network Symposium*, College Park, Maryland.
- Wessels K.J. and Prince S.D. (2004) Assessing the effect of human-induced land degradation on ecosystem function in the former homelands of South Africa. *American Geophysical Union meeting*, San Francisco.
- Reshef I., Prince S.D., and Wessels K.J. (2004) Detection of human induced degradation of dry lands at regional scales. *American Geophysical Union meeting*, San Francisco.
- Wessels K.J., Prince S.D., Small J. (2003) Monitoring Land Degradation in Southern Africa based on Net Primary Productivity. *IGARSS Conference*, Toulouse, France.
- Smith H.J., Wessels K.J. and Twyman L. (2003) Spatial Soil Erosion Modelling for Conservation Planning in the Mpumalanga Province of South Africa. *Soil Science Society of South Africa congress*, Stellenbosch, awarded “Best Paper/Poster on New, Implementable Technology”
- Wessels K.J., Prince S.D. and Reshef I. (2001) Detection and Mapping of Desertification. *American Geophysical Union meeting*, San Francisco.
- Wessels K.J., Van den Berg H.M. and Van der Merwe A. (2000) Spatial natural resource monitoring in Mpumalanga province of South Africa. *28TH International Symposium on Remote Sensing of the Environment*. Cape Town.
- Van der Merwe A., Wessels K.J., van den Berg H.M. and Fortescue A. (2000) A benchmark approach to map rangeland condition from Landsat TM imagery in the Mpumalanga province of South Africa. *28TH International Symposium on Remote Sensing of the Environment*. Cape Town.
- Van den Berg H.M., van der Merwe A. and Wessels K.J. (2000) Soil and vegetation mapping using point data and multi-surface modeling. *Accuracy 2000 Symposium*, Amsterdam.
- Frost P.E. and Wessels K.J. (2000) Identification and evaluation of potentially degraded areas in Mpumalanga using NOAA NDVI and rainfall data. *Grassland Society of SA congress*, Zimbabwe.
- Hoare D. and Wessels K.J. (2000) Diversity and Conservation of Highveld grasslands. *South African Association of Botanists Symposium*, Cape Town.

- Reyers B., Wessels K.J., and van Jaarsveld A.S. (1999) Rangeland transformation in northern South Africa: prospects for biodiversity conservation. *International Rangeland Conference*, Townsville, Australia.
- Van den Berg H.M., Westfall B. and Wessels K.J. (1999) Identification and mapping of plant functional types using remote sensing and GIS modeling. *International Rangeland Conference*, Townsville, Australia.
- Wessels K.J. and Frost P.E. (1999) NOAA NDVI dataset for long-term ecological research. *Long term ecological research workshop*. Skukuza, South Africa.

REFEREE FOR JOURNALS

- Remote Sensing of Environment
- International Journal of Remote Sensing
- Journal of Geophysical Research
- Regional Environmental Change
- Photogrammetric Engineering & Remote Sensing
- Applied Vegetation Science

EXTERNAL EXAMINER

- Dept Environmental and Geographical Science, University of Cape Town

SCHOLARSHIPS AND AWARDS

- NASA Earth System Sciences Fellowship, 2002 to 2005
- Baker Award for Best Graduate Student in Geography, University of Maryland, 2005.
- Foundation for Research Development (South Africa), Honours (1993) and MSc Scholarships (1995, 1996).
- De Beers Consolidated Mines (South Africa), MSc Scholarship 1995, 1996.
- IBM South Africa scholarships, 1990 to 1993.
- University of Pretoria Prestige bursaries 1991-1996.

OTHER COURSES ATTENDED

- ERDAS-Imagine, image processing software, GIMS, Nov. 1998.
- ArcView Spatial Analyst, GIMS, Nov. 1998.
- Project management course, CSIR, Pretoria, 2000.
- Creative Research and Development Management course, Inside Lane, Oct. 1997.
- Marketing course, Inside Lane, Aug. 1997.