

Curriculum Vitae

Name: Philip K Thornton

Flagship Leader & Principal Scientist, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), International Livestock Research Institute (ILRI), Nairobi, Kenya.

Honorary Fellow (2009-2015), School of GeoSciences, University of Edinburgh, Edinburgh, UK.

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Educational History

- BSc (Hons), Reading University (Agricultural Systems), 1979.
- PhD, Lincoln College, University of Canterbury, New Zealand (Farm Management and Agricultural Economics), 1983.

Professional Positions

Flagship Program Leader, *Policies and institutions for climate resilient food systems*, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), hosted at ILRI, Nairobi, January 2014 to date.

Research Theme Leader, *Integration for Decision Making*, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), hosted at ILRI, Nairobi, January 2010 to date.

Principal Scientist, International Livestock Research Institute, Nairobi, Kenya, based in the UK, October 2002 to date.

Programme Coordinator, Systems Analysis and Impact Assessment, International Livestock Research Institute, Nairobi, Kenya, March 2000 to August 2002.

Scientist and Project Coordinator, Systems Analysis and Impact Assessment, International Livestock Research Institute, Nairobi, Kenya, July 1996 -February 2000 (project coordinator from July 1997).

Senior Scientist--Economist/Systems Modeller, International Fertilizer Development Center, Muscle Shoals, Alabama, September 1990 to June 1996.

Research Fellowship, Division of Rural Resource Management, Edinburgh School of Agriculture, University of Edinburgh, June 1987 to August 1990.

Post-doctoral Fellow in the Cattle Production Systems section of the Tropical Pastures Program, Centro Internacional de Agricultura Tropical (CIAT), Colombia, June 1984 to April 1987.

Skills and International Experience

- Over thirty years' experience as a researcher and research leader in agricultural research for development organisations, in the fields of farming systems research, farm management and agricultural economics, bio-economic modelling, impact assessment, and priority setting.
- Wide-ranging experience working in, and leading, multi-disciplinary teams.

- An expert synthesiser and writer, and a skilled communicator with excellent planning and organisational skills.
- Well-developed computing abilities in programming, GIS and statistical packages.
- Conversational Spanish, some knowledge of written and spoken French.

Experience as project leader, trainer, and/or researcher in many countries all over the world, including Albania, Bangladesh, Colombia, Ethiopia, Guatemala, India, Kenya, Malawi, Nepal, Netherlands, Philippines, Republic of South Africa, Romania, Tanzania, Uganda, Uruguay, Zimbabwe.

In the last ten years, consultancies undertaken for the World Bank, FAO, the Science Council of the CGIAR, IDRC, the Wildlife Conservation Society, and three UK Government Foresight Projects (*Detection of Infectious Diseases*, *Global Food and Farming Futures*, and *Migration and Global Environmental Change*).

Synergistic Activities

- Member of the Board of Directors, Soil Management Collaborative Research Support Program (**SM-CRSP**), US-AID, July 1997 to September 2008.
- Member of the Board of Directors, International Consortium for Agricultural Systems Applications (**ICASA**), March 1997 to April 2012.
- Member of the Scientific Advisory Committee of **GECAFS** (Global Environmental Change and Food Systems programme), August 2008 to March 2011.
- Member of the Scientific Advisory Committee of **AgMIP** (Agricultural Model Intercomparison and Improvement Project), October 2010 to date.
- Book review editor and editorial board, ***Agricultural Systems*** (Elsevier), January 1988 to 2001.
- Editor-in Chief, ***Agricultural Systems*** (Elsevier), January 2002 to date (currently on leave from editor's duties).

Postgraduate Supervision & Examination

- Supervised PhD and other students from the USA, Kenya, Brazil.
- Served as external PhD examiner to the University of Edinburgh, University of Aberdeen, Wageningen University (The Netherlands), University of Waikato (New Zealand), University of Cape Town.

Publications

Refereed journal papers: 119.

Books, book chapters, proceedings, published research reports: 318.

Awards, Nominations, Achievements

- Commonwealth Scholarship, 1981-1983.
- Nominated for the CGIAR Scientist of the Year Award, 2005, 2006, 2007.
- Tropical Agriculture Association's "Tropical Agriculturalist of the Year", 2009.
- 2012 Sustainability Science Award, Ecological Society of America.
- McMaster Research Fellow, CSIRO, 2015-2016.

Contributions to Global Assessments

- Reviewer of, and contributor to, the IPCC's Fourth Assessment Report, *Impacts, Adaptation and Vulnerability* (2007).
- Lead author (*Future of agricultural knowledge, science and technology*) and contributing author (*Outlook on agricultural change and its drivers*), International Assessment of Agricultural Science and Technology for Development (IAASTD) (2008).
- Contributing author to Chapter 7 (Food Security and Food Production Systems) of the IPCC's Fifth Assessment Report, *Climate Change 2014: Impacts, Adaptation, and Vulnerability*.

Other Key Contributions

- Major contributions to organisational strategic planning, *ex ante* impact assessment and program design, particularly with IFDC, ILRI and CCAFS.
- Path-breaking, highly-cited work on farming systems classification, and poverty and vulnerability mapping in Africa.
- Highly-cited work dating from the late 1990s onwards on potential impacts of climate change on agriculture in the global tropics, with a particular focus on sub-Saharan Africa.
- Major contributions to household modelling in developing countries using a wide variety of different model types and integrated assessment.
- Contributions to productive and effective interfacing of hard and soft sciences, via social learning and incorporating theory of change and impact pathways into research planning and implementation.

1 REFEREED JOURNALS

119. Searchinger T D, Estes L, Thornton P K, Beringer T, Notenbaert A, Rubinstein D, Heimlich R, Licker R and Herrero M (2015). High carbon and biodiversity costs from converting Africa's wet savannas to cropland. *Nature Climate Change* (in press).

118. Fritz S, See L, McCallum I, You L, Bun A, Albrecht F, Schill C, Perger C, Duerauer M, Havlik P, Mosnier A, Thornton P, Wood-Sichra U, Herrero M, Becker-Reshef I, Justice C, Hansen M, Gong P, Abdel Aziz S, Cipriani A, Cumani R, Cecchi G, Conchedda G, Ferreira S, Gomez A, Haffani M, Kayitakire F, Malanding J, Mueller R, Newby T, Nonguierma A, Olesgun A, Ortner S, Ram R, Rocha J, Schepaschenko D, Schepaschenko S, Terekhov A, Tiangwa A, Vancutsem C, Vintrou E, Wenbin W, van der Velde M, Dunwoody A, Kraxner F, Obersteiner M (2015). Mapping global cropland and field size. *Global Change Biology* (in press).

117. Herrero M, Conant R T, Havlik P, Hristov A N, Smith P, Gerber P, Gill M, Butterbach-Bahl K, Henderson B, Valin H and Thornton P K (2015). Greenhouse gas mitigation potentials in the livestock sector. *Nature Climate Change* (submitted).

116. See L, Fritz S, You L, Ramankutty N, Herrero M, Justice C, Becker-Reshef I, Thornton PK, Erb K, Gong P, Tang H, van der Velde M, Ericksen P, McCallum I, Kraxner F, Obersteiner M (2014). Improved global cropland data as an essential ingredient for food security. *Global Food Security*, <http://dx.doi.org/10.1016/j.gfs.2014.10.004>

115. Förch W, Kristjanson PM, Cramer L, Barahona C, Thornton PK (2014). Back to baselines: Measuring change and sharing data. *Agriculture and Food Security* 3, 13 (<http://www.agricultureandfoodsecurity.com/content/3/1/13>)

114. Lipper L, Thornton PK, Campbell B, Baedeker T, Braimoh A, Bwalya M, Caron P, Cattaneo A, Garrity D, Henry K, Hottle R, Jackson L, Jarvis A, Kossam F, Mann W, McCarthy N, Meybeck A, Neufeldt H, Remington T, Sen PT, Sessa R, Shula R, Tibu A, Torquebiau EF (2014). Climate smart agriculture for food security. *Nature Climate Change* 4, 1068-1072.
113. Campbell B, Thornton PK, Zougmore R, van Asten P, Lipper L (2014). Sustainable intensification: what is its role in climate smart agriculture? *Current Opinion in Environmental Sustainability* 8, 39-43.
112. Tedeschi LO, Cavalcanti LFL, Fonseca MA, Herrero M, Thornton PK (2014). The evolution and evaluation of dairy cattle models for predicting milk production: an agricultural model intercomparison and improvement project (AgMIP) for livestock. *Animal Production Science* (in press).
111. Thornton PK, Ericksen PJ, Herrero M and Challinor A J (2014). Climate variability and vulnerability to climate change: a review. *Global Change Biology* 20 (11), 3313-3328. DOI: 10.1111/gcb.12581
110. Thornton PK, Herrero M (2014). Climate change adaptation in mixed crop-livestock systems in developing countries. *Global Food Security* 3, 99-107.
109. Vervoort J, Thornton PK, Kristjanson P, Förch W, Ericksen P, Kok K, Ingram JSI, Herrero M, Palazzo A, Helfgott A, Wilkinson A, Havlik P, Mason-D'Croz D, Jost C (2014). Food systems futures: towards adaptation pathways across multiple dimensions and levels. *Global Environmental Change*, <http://dx.doi.org/10.1016/j.gloenvcha.2014.03.001>
108. Herrero M, Thornton PK, Bernués A, Baltenweck I, Vervoort J, van de Steeg J, Makokha S, van Wijk M T, Karanja S, Staal SJ (2014). Exploring future changes in smallholder farming systems by linking socio-economic scenarios with regional and household models. *Global Environmental Change* 24, 165-182.
107. Havlík P, Valin H, Herrero M, Obersteiner M, Schmid E, Rufino M, Mosnier A, Thornton PK, Böttcher H, Conant RT, Frank S, Fritz S, Fuss S, Kraxner F, Notenbaert A (2014). Climate change mitigation through livestock system transitions. *PNAS* 111(10), 3709-3714.
106. Challinor AJ, Matre P, Asseng S, Thornton PK, Ewert F (2014). Climate impacts ensembles: making the most of international coordination. *Nature Climate Change* 4, 77-80.
105. Kristjanson PM, Harvey B, Van Epp M, Thornton PK (2014). Social learning and sustainable development. *Nature Climate Change* 4, 5-7.
104. Klapwijk CJ, van Wijk MT, Rosenstock TS, van Asten PJA, Thornton PK, Giller KE (2014). Analysis of trade-offs in agricultural systems: current state and way forward. *Current Opinion in Environmental Sustainability* 6, 110-115.
103. Herrero M and Thornton P K (2013). Livestock and global change: emerging issues for sustainable food systems. *PNAS* 110 (52), 20878-20881.
102. Herrero M, Havlík P, Valin H, Notenbaert AM, Rufino M, Thornton P K, Blummel M, Weiss F, Obersteiner M (2013). Global livestock systems: biomass use, production, feed efficiencies and greenhouse gas emissions. *PNAS* 110 (52), 20888-20893.
101. Rufino MC, Thornton PK, Ng'ang'a SK, Mutie I, Jones PG, van Wijk MT, Herrero M (2013). Transitions in agro-pastoralist systems of East Africa: impacts on food security and poverty. *Agriculture, Ecosystems and Environment* 179, 215-230.
100. Garnett T, Appleby MC, Balmford A, Bateman IJ, Benton TG, Bloomer P, Burlingame B, Dawkins M, Dolan L, Fraser D, Herrero M, Smith P, Thornton PK, Toulmin C, Vermeulen SJ, Godfray HJ (2013). Sustainable Intensification in agriculture; navigating a course through competing priorities. *Science* 341, 33-34.
99. Vermeulen SJ, Challinor AJ, Thornton PK, Campbell BM, Eriyagama N, Vervoort JM, Kinyangi J, Jarvis A, Läderach P, Ramirez-Villegas J, Nicklin KJ, Hawkins E and Smith DR (2013). Addressing uncertainty in adaptation planning for agriculture. *PNAS* 110 (21), 8357-8362.

98. Ramirez-Villegas J, Challinor A C, Thornton P K and Jarvis A (2013). Implications of regional improvement in global climate models for agricultural impacts research. *Environmental Research Letters* 8, 024018.
97. Challinor A J, Stafford Smith M and Thornton P K (2013). Use of agro-climate ensembles for quantifying uncertainty and informing adaptation. *Agricultural and Forestry Meteorology* 170, 2-7.
96. Jones P G and Thornton P K (2013). Generating downscaled weather data from a suite of climate models for agricultural modelling applications. *Agricultural Systems* 114, 1-5.
95. Fritz S, See L, You L, Justice C, Becker-Reshef I, Bydekerke L, Cumani R, Defourny P, Foley J, Gilliams S, Gong P, Hansen M, Hertel T, Herold M, Herrero M, Kayitakire F, Latham J, Leo O, McCallum I, Obersteiner M, Ramankutty N, Rocha J, Tang H, Thornton P K, Vancutsem C, van der Velde M, Wood S and Woodcock C (2013). The need for improved maps of global cropland. *Eos, Transactions of the American Geophysical Union* 94 (3), 31-32.
94. Ash A, Thornton P K, Stokes C and Togtohyn C (2012). Is proactive adaptation to climate change necessary in grazed rangelands? *Rangeland Ecology and Management* 65, 563-568.
93. Claessens L, Antle J M, Stoorvogel J J, Thornton P K and Herrero M (2012). A method for evaluating climate change adaptation strategies for small-scale farmers using survey, experimental and modeled data. *Agricultural Systems* 111, 85-95.
92. Kristjanson P, Neufeld H, Gassner A, Thornton P K, Förch W, Mango J, Kyazze F, Desta S, Kayula G, Thiede B and Kinyangi J (2012). Are food insecure smallholder households making changes in their farming practices? Evidence from East Africa. *Food Security* DOI 10.1007/s12571-012-0194-z
91. Vermeulen S J, Aggarwal P K, Ainslie A, Angelone C, Campbell B M, Challinor A J, Hansen J W, Ingram J S I, Jarvis A, Kristjanson P, Lau C, Nelson G C, Thornton P K and Wollenberg E (2012). Options for support to agriculture and food security under climate change. *Environmental Science & Policy* 15, 136-144.
90. Moore N, Alagarswamy G, Pijanowski B, Thornton P K, Lofgren B, Olson J, Andresen J, Yanda P and Qi J (2012). East African food security as influenced by future climate change and land use change at local to regional scales. *Climatic Change* 110, 823-844.
89. Vermeulen S, Zougmore R, Wollenberg E, Thornton P K, Nelson G, Kristjanson P, Kinyangi J, Jarvis A, Hansen J, Challinor A J, Campbell B and Aggarwal P K (2011). Climate change, agriculture and food security: a global partnership to link research and action for low-income agricultural producers and consumers. *Current Opinion in Environmental Sustainability* 4, 1-6.
88. Herrero, Gerber P, Vellinga T, Garnett T, Leip A, Opio C, Westhoek H J, Thornton P K, Olesen J, Hutchings N, Montgomery H, Soussana J-F, Steinfeld H and McAllister T (2011). Livestock and greenhouse gas emissions: the importance of getting the numbers right. *Animal Feed Science and Technology* 166-167, 779-782.
87. Boone R B, Galvin K A, BurnSilver S B, Thornton P K, Ojima D A and Jawson J R (2011). Using coupled simulation models to link pastoral decision making and ecosystem services. *Ecology and Society* 16(2), 6. [online] URL: <http://www.ecologyandsociety.org/vol16/iss2/art6/>
86. Thornton PK, Jones P G, Ericksen P J and Challinor A J (2011). Agriculture and food systems in sub-Saharan Africa in a four-plus degree world. *Philosophical Transactions of the Royal Society Series A* 369, 117-136. doi:10.1098/rsta.2010.0246
85. Thornton P K and Herrero M (2010). The potential for reduced methane and carbon dioxide emissions from livestock and pasture management in the tropics. *PNAS* 107 (46), 19667-19672. doi/10.1073/pnas.0912890107
84. Thornton P K (2010). Livestock Production: Recent trends, future prospects. *Philosophical Transactions of the Royal Society Series B* 365, 2853-2867.

83. Herrero M, Thornton P K, Notenbaert A, Wood S, Msangi S, Freeman H A, Bossio D, Dixon J, Peters M, van de Steeg J, Lynam J, Parthasarathy Rao P, Macmillan S, Gerard B, McDermott J, Seré C, Rosegrant M (2010). Smart investments in sustainable food production: revisiting mixed crop-livestock systems. *Science* 327, 822-825.
82. Thornton P K and Gerber P (2010). Climate change and the growth of the livestock sector in developing countries. *Mitigation and Adaptation Strategies for Global Change* 15, 169-184.
81. Thornton P K, Jones P G, Alagarswamy G, Andresen J, Herrero M (2010). Adapting to climate change: agricultural system and household impacts in East Africa. *Agricultural Systems* 103, 73-82.
80. Doherty R M, Sitch S, Smith B, Lewis S L and Thornton P K (2010). Implications of future climate and atmospheric CO₂ content for regional biogeochemistry, biogeography and ecosystem services across East Africa. *Global Change Biology* 16 (2), 617-640.
79. Herrero M, Thornton P K, Gerber P, Reid R S (2009) Livestock, livelihoods and the environment: understanding the trade-offs. *Current Opinion in Environmental Sustainability* 1, 111-120.
78. Thornton P K, van de Steeg J, Notenbaert A and Herrero M (2009). The impacts of climate change on livestock and livestock systems in developing countries: a review of what we know and what we need to know. *Agricultural Systems* 101, 113-127.
77. Quiros C, Thornton P K, Herrero M, Notenbaert A and González-Estrada E (2009). GOBLET: An open-source geographic overlaying database and query module for spatial targeting in agricultural systems. *Computers and Electronics in Agriculture* 68(1), 114-128.
- 76 Jones P G and Thornton P K (2009). Croppers to livestock keepers: Livelihood transitions to 2050 in Africa due to climate change. *Environmental Science and Policy* 12, 427-437.
- 75 Thornton P K, Jones P G, Alagarswamy A and Andresen J (2009). Spatial variation of crop yield responses to climate change in East Africa. *Global Environmental Change* 19, 54-65.
- 74 Hobbs N T, Galvin K A, Stokes C J, Lockett J M, Ash A J, Boone R B, Reid R S and Thornton P K (2008). Fragmentation of rangelands: implications for humans, animals, and landscapes. *Global Environmental Change* 18, 776–785.
- 73 Thornton P K, Jones P G, Owiyo T, Kruska R L, Herrero M, Kristjanson P, Notenbaert A, Bekele N and Omolo A (2008). Climate change and poverty in Africa: mapping hotspots of vulnerability. *African Journal of Agricultural and Resource Economics* 2 (1), 24-44.
- 72 Bulte E H, Boone R B, Stringer R and Thornton P K (2008). Elephants or onions? Paying for nature in Amboseli, Kenya. *Environment and Development Economics* 13, 395-414.
- 71 Herrero M, Thornton P K, Kruska R L and Reid R S (2008). The spatial distribution of methane emissions from African domestic ruminants to 2030. *Agriculture, Ecosystems and Environment* 16, 122-137.
- 70 Gonzalez-Estrada E, Rodrigues L C, Walen V K, Naab J B, Koo J, Jones J W, Herrero M and Thornton P K (2008). Carbon sequestration and farm income in West Africa: Identifying best management practices for smallholder agricultural systems in northern Ghana. *Ecological Economics* 67, 492-502.
- 69 Olson J M, Alagarswamy G, Andresen J, Campbell D J, Ge J, Huebner M, Lofgren B, Lusch D P, Moore N, Pijanowski B C, Qi J, Thornton P K, Torbick N and Wang J (2008). Integrating diverse methods to understand climate-land interactions in East Africa. *GeoForum* 39, 898-911.
- 68 Thornton P K, Herrero M, Freeman A, Okeyo M, Rege E, Jones P G and McDermott J (2007). Vulnerability, climate change and livestock – opportunities and challenges for the poor. *Journal of Semi-Arid Tropical Agricultural Research* 4(1). (published online at <http://www.icrisat.org/Journal/specialproject.htm>).
- 67 Waithaka M M, Thornton P K, Shepherd K D and Ndiwa N D (2007). Enhancing sustainable soil fertility management

- by smallholders: the case of Vihiga, western Kenya. *Nutrient Cycling in Agroecosystems* 78 (3), 211-224.
- 66 Thornton P K, Boone R B, Galvin K A, BurnSilver S B, Waithaka M M, Kuyiah J, Karanja S, González-Estrada E and Herrero M (2007). Coping strategies in livestock-dependent households in East and southern Africa: a synthesis of four case studies. *Human Ecology* 35 (4), 461-476.
- 65 Gijsman A J, Thornton P K and Hoogenboom G (2007). Using the WISE database to parameterize soil inputs for crop simulation models. *Computers and Electronics in Agriculture* 56, 85-100.
- 64 Herrero M, Gonzalez-Estrada E, Thornton P K, Quiros C, Waithaka M M, Ruiz R and Hoogenboom G (2007). IMPACT: Generic household-level databases and diagnostics tools for integrated crop-livestock systems analysis. *Agricultural Systems* 92, 240-265.
- 63 Thornton P K (2006). Ex ante impact assessment and seasonal climate forecasts: status and issues. *Climate Research* 33, 55-65.
- 62 Thornton P K, Stroud A, Hatibu N, Legg C, Ly S, Twomlow S, Molapong K, Notenbaert A, Kruska R and von Kaufmann R (2006). Site selection to test an integrated approach to agricultural research for development: combining expert knowledge and participatory Geographic Information System methods. *International Journal of Agricultural Sustainability* 4 (1), 39-60.
- 61 Boone R B, Galvin K A, Thornton P K, Swift D M and Coughenour M B (2006). Cultivation and conservation in Ngorongoro Conservation Area, Tanzania. *Human Ecology* 34 (6), 809-828.
- 60 Waithaka M M, Thornton P K, Shepherd K D and Herrero M (2006). Bio-economic evaluation of farmers' perceptions of viable farms in western Kenya. *Agricultural Systems* 90, 243-271.
- 59 Galvin K A, Thornton P K, de Pinho J, Sutherland J and Boone R B (2006). Integrated modeling and its potential for resolving conflicts between conservation and people in the rangelands of East Africa. *Human Ecology* 34 (2), 155-183.
- 58 Thornton P K, BurnSilver S B, Boone R B and Galvin K A (2006). Modelling the impacts of group ranch subdivision on households in Kajiado, Kenya. *Agricultural Systems* 87, 331-356.
- 57 Boone R B, BurnSilver S B, Thornton P K, Worden J S and Galvin K A (2005). Quantifying declines in livestock due to land subdivision in Kajiado District, Kenya. *Rangeland Ecology and Management* 58, 523-532.
- 56 Reid R S, Thornton P K and Kruska R L (2004). Fragmentation and loss of habitat for pastoral people and wildlife in East Africa: concepts and issues. *African Journal of Range and Forage Science* 21 (3), 171-181.
- 55 Galvin K A, Thornton P K, Boone R B and Sunderland J (2004). Climate variability and impacts on East African livestock herders. *African Journal of Range and Forage Science* 21 (3), 183-189.
- 54 Nicholson C F, Thornton P K and Muinga R (2004). Household-level impacts of dairy cow ownership in coastal Kenya. *Journal of Agricultural Economics* 55 (2), 175-195.
- 53 Thornton P K, Fawcett R H, Galvin K A, Boone R B, Hudson J W and Vogel C H (2004). Evaluating management options that use climate forecasts: modelling livestock production systems in the semi-arid zone of South Africa. *Climate Research* 26, 33-42.
- 52 Reid R S, Thornton P K, McCrab G J, Kruska R L, Atieno F and Jones P G (2003). Is it possible to mitigate greenhouse gas emissions in pastoral ecosystems of the tropics? *Environment, Development and Sustainability* 6, 91-109.
- 51 Romney D L, Thorne P, Lukuyu B and Thornton P K (2003). Maize as food and feed in intensive smallholder systems: an evaluation of some options for improved integration in mixed farming systems of Kenya, Tanzania and Zimbabwe. *Field Crops Research* 84, 159-168.
- 50 Thornton P K, Kristjanson P M and Thorne P J (2003). Measuring the potential impacts of improved food-feed crops:

methods for *ex ante* assessment. *Field Crops Research* 84, 199-212.

49 Thornton P K, Kruska R L, Henninger N, Kristjanson P M and Reid R S (2003). Livestock and poverty maps for research and development targeting in the developing world. *Land Use Policy* 20, 311-322.

48 Jones P G and Thornton P K (2003). The potential impacts of climate change in tropical agriculture: the case of maize in Africa and Latin America in 2055. *Global Environmental Change* 13, 51-59.

47 Kruska R L, Reid R S, Thornton P K, Henninger N and Kristjanson P M (2003). Mapping livestock-orientated agricultural production systems for the developing world. *Agricultural Systems* 77, 39-63.

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45 Du Toit A S, Prinsloo M A, Wafula B M and Thornton P K (2002). Incorporating a water logging routine into CERES-Maize, and some preliminary evaluations. *Water SA* 28 (3), 323-328.

44 Kristjanson P M, Place F, Franzel S and Thornton P K (2002). Assessing research impact on poverty: the importance of farmers' perspectives. *Agricultural Systems* 72, 73-92

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21 Thornton P K, Blair-Fish J A and Wilson S M D (1991). Crop simulation modelling using a transputer-based parallel computer. *Agricultural Systems* 35 (3), 321-337.

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